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ABSTRACT

This guide was developed for use in grades K-6 as an enrichment program based on clarifying values. The program, designed by teachers, aims to develop in the student a greater awareness and understanding of the community, themselves, and the earth. The program includes a number of environmental encounters. Topical themes lead teachers and students through main areas of awareness: Plants and Animals, Water, Air, Energy, Natural Resources, Land Use, and Aesthetics and Pollution. The conceptual schemes under each area of awareness increase in complexity according to the development level of the students. The activities in the encounters are action-oriented, student-centered activities which provide "hands-on" learning experiences. Each encounter provides background information, behavioral objectives, activities, a resource reference listing, and value clarification strategies. Instructions for use of the value clarification strategies contained in the program are included. (Author/RH)

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# WHAT'S IT ALL ABOUT?

"Valuing the Environment" is an invitation to learning in and about the environment. It is an enrichment program based on clarifying values. It is not a new course. Rather it is an interdisciplinary program which complements the existing curriculum. It was designed by teachers to help students, K-6, develop an awareness and better understanding of the community, themselves, and the spaceship earth.

Program packets include: Environmental Encounters, grouped grades K-2, 3-4, and 5-6, and a chart of Topical Themes and Conceptual Schemes. Topical Themes lead teachers and students through seven main areas of awareness:"Plants and"Animals," "Water," "Air," "Energy,""Natural Resources," "Land Use," and "Aesthetics and Pollution." Conceptual Schemes under each area of awarensss increase in complexity according to the development level of the students. However, teachers are encouraged to use materials from all grade levels if it seems appropriate. Flexibility is a key to the program.

Environmental Encounters are action-oriented, student-centered activities, which provide "hands-on" learning experiences for students in the classroom, on the school grounds, or in the nearby community. Environmental Encounters encourage students to consider alternative solutions to environmental problems. Each encounter provides background information for the teacher, behavioral objectives and activities, values clarification strategies and a resource reference listing.

Values Clarification strategies are interwoven into the program because development of attitudes and a lifestyle compatible with the natural environment is not only related to awareness and understanding of environmental issues, but it is also related to daily decision-making and action.

As future citizens, students of today will be asked to make decisions in the market place, in the home, in the voting booth and in the business world which will have an impact on environmental quality. "Valuing the Environment" introduces students and teachers to some of these choices -- choices about everyday events which affect environmental quality.

When using the values clarification strategies, teachers are urged to encourage an atmosphere of openness, acceptance and respect. If students sense that something they value is going to be frowned upon, they will not want to share their feelings.

If a student does not want to respond, the student should be allowed to pass -- with respect! Whenever possible, the teacher should participate. However, it is best for the teacher to express his or her view toward the end, so as not to influence student choices.

Instructions on major values clarification strategies used in the program follow. Further information on values clarification and full explanations of each strategy appear in Values Clarification, A Handbook of Practical Stragegies for Teachers and Students by Simon, Howe, and Kirschenbaum.

1. Continuum
   The teacher draws a long line on the board. The teacher and the class determine two polar positions on an issue. The positions are placed at the opposite ends of the line, and a series of points are marked along the continuum. The teacher whips around the room, asking students to tell where they stand on the issue, briefly describing the position. After five to ten students respond, everyone determines his or her own position. Followed by a free-wheeling position.

2. Alternatives Search
   The teacher states a value-laden problem such as "ways to save energy" or "things to do to improve the playground environment," and asks students to individually brain-storm alternative solutions to the problem ( three to five minutes). Students then, in groups of three or four, combine individual lists, add new solutions, and choose the three alternatives they like best and rank order these (in about ten minutes). Group report results to the class.
3. Values Wheel
   Teacher reads a percentage question, asking students to record their answers on an individual circle which they divide into pie-shaped segments representing the relative strength of their answers. Each student chooses a partner and discusses the reasons for the valuation ( approximately two minutes).
4. Values Auction
   Items listed are to be sold at an auction to the highest bidder, according to the following rules. You are to pretend that you have none of the items listed, you have a total of $ 5,000 to spend and that you can spend no more than $ 2,500 on any one item. Bids must open at no less than $ 50 and no more than $ 500, and must proceed by increments of no less than $ 50 and no more than $ 100.
5. Role Playing
   An environmental issue is described and students assume roles of individuals who are seeking solutions to the problem.
6. Values Grid
   List some general issues, such as water pollution or population control. Next to the issue students privately write a few key words to summarize their position on each issue. The teacher reads the following questions:
   1. Are you proud of ( do you prize or cherish) your position?
   2. Have you publicly affirmed your position?
   3. Have you chosen your position from alternatives?
   4. Have you chosen your position after thoughtful consideration of the pros and cons and consequences?
   5. Have you chosen your position freely?
   6. Have you acted on or done anything about your beliefs?
   7. Have you acted with repetition pattern or consistency on this issue?

   For each issue, students check the appropriate box if they can answer the question affirmatively.
7. Values Voting
   After each question is read, the students take a position by a show of hands. Affirmative, hands up; negative, hands down. The undecided fold their arms. Discussion is tabled until all questions have been completed.
8. Rank Order
   Teacher presents three or four alternative choices for responding to each question( generally written on the board), and ask students to rank order the choices, on paper, according to their own preferences. Teachers call on six or eight students to give their rankings. Discussion follows.

Pre-post tests have been developed by teachers that will measure conceptual knowledge and values judgement. Contact the Environmental Education Center at the Charlotte Nature Museum, 1658 Sterling Road, Charlotte, N.C. 28209, 704-333-0506. In addition to the testing an attitudinal inventory is available from the same source that can be used with students and parents.
Sixth grade students may participate in a planetarium program, "Viewing the Earth from Space," as a culminating activity and a sequential part of the planetarium usage.

## VALUING THE ENVIRONMENT

| | | Typical Theme | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Grade Level | | PLANTS AND ANIMALS: Give and Take | WATER: Liquid Life | AIR: Air Today -- Gone Tomorrow | ENERGY: Go Power | NATURAL RE-SOURCES: Treasures of Our Earth | LAND USE: Mirror of Values | ASETHETICS AND POLLU-TION: Good and Bad |
| 1-2 | Conceptual Schemes | Living plants and animals are interdependent. | Water is vital to all living plants and animals. | Air is important to life in many ways. | Energy means power. | People depend on the earth's resources. | Earth has the capacity to support many changing environments. | What is pleasing and what is not? |
| 3-4 | | Interdepency of living organisms involves the natural and man-made environment. | Water quality is important to plants and animals. | Air is a necessity of the living and non-living. | Waste not - want not. | Abuse and misuse has led to environmental degradation. | The use of land is determined by people's values. | Man has the ability to manipulate and change the environment. |
| 5-6 | | The relationships of plants and animals with each other and and their environment. | Man must learn the wise re - use of water. | Man is his own worst enemy. | Energy is the central force in the patterns and cycles of living and non-living | Man's survival depends on his wise use and management of the resources in his environment. | Environmental qua - lity should be the guide for community development. | Conflicts emerge between private land use and environmental quality for the public. |

# WHISTLE PIG AND FRIENDS

Grades K-3

## I. INTRODUCTION

When people build homes, schools, shopping centers, roads, and the like, we find that natural areas are destroyed and replaced by urbanization. Habitats for many small animals disappear so they have to leave the community. Hence, they migrate or die, since an animal habitat is where it finds essentials for survival. Some of these essentials are clean water, clean air and a good food supply, as well as shelter for raising the young. An example of one such animal is the groundhog, otherwise known as a woodchuck or a whistle pig.

Urbanization of an environment greatly affects available vegetation, limiting habitat diversity for animals in the city. Clearing of underbrush, paving of land, defiling water, and polluting air tend to alter animal habitats.

Groundhogs are able to adapt to live with man, being partly dependent on him for food. Thus, they will take advantage of man's farming activities. However, the groundhog is one animal that can survive apart from human environment. Therefore, it is important for children to have a basic understanding of such little animals, and for them to develop an awareness and a better understanding of the community themselves.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the conclusion of a successful encounter, the children should be able to:

1. Realize that the groundhog plays a role in our environment.
2. Distinguish from relatives such as - -
   a) gray squirrel
   b) chipmunk
   c) prairie
   d) mole
3. Identify type habitat of the groundhog and where they can be found.
   a) banks of streams, rivers, and swamps
   b) rolling pastures and hills
   c) near old buildings, as well as cultivated fields
   d) edge of woods, hedgerows, windrows that are near cleared land.
4. Name the natural enemies of the groundhog:
   a) foxes
   b) bears
   c) bobcats
   d) cats and dogs
   e) hawks
   f) floods
   g) man
5. Identify related animals found in same habitat:
   a) rabbit
   b) chipmunk
   c) skunk
   d) mink
   e) ground squirrel
   f) weasel
   g) rattlesnake
   h) green snake
6. Understand that people changing the environment by using bulldozer, flooding land or putting in industry are creating problems for the groundhog and other related animals.
7. Know that at the first sign of danger, the groundhog utters a shrill whistle that sends the family scooting into burrows.

8. Tell how large a groundhog is:
   a) roughly two-feet long when grown
   b) compare with size of:
      1. cocker or collie
      2. a cat
      3. chipmunk
      4. gray squirrel
9. Name the habits of the groundhog.
   a) hibernates
   b) lives in a burrow in the ground
   c) has a good appetite so lives near food
   d) active in morning and in the afternoon
   e) rests and suns in mid-day in front of burrow, or on a rock high enough up for a good view of an approaching enemy.

B. Activities:

1. Show pictures of groundhog (p.4, Wildlife, July, 1974).
   a) Discuss picture
   b) What animal looks like
   c) What the land around him looks like
2. Show film, "Tale of Groundhog's Shadow".
   a) Discuss film in class
   b) Tell children to ask parents what the groundhog does February 2, and report back in class next day.
3. Take a trip to the Nature Museum to see a live groundhog and other small animals there.
   a) Let children draw a picture of the groundhog they saw there.
   b) Discuss physical appearance of the groundhog.
4. Draw a picture of the kinds of food the groundhogs eat.
   a) grass
   b) beans
   c) cabbage
   d) peas
   e) lettuce
   f) tomatoes
   g) fruit (blackberries)
   h) watermelon
   i) bark of trees
   j) alfalfa
   k) clover
   l) corn
   m) peanuts
5. Show filmstrip, "Animal Homes."
   a) Discuss types of homes
   b) Ask students to watch animals in their homes and discuss
6. Show filmstrip, "Animals in Winter."
   a) Discuss hibernation
   b) Discuss how animals that do not hibernate find food
7. Take a field trip around your school or to a park.
   a) Look for possible burrow or den
   b) Look for other types of animal homes
8. Pollution (discussion)
   a) What is pollution?
   b) What is litter?
   c) What can be done about littering?
   d) What is ecology?
   e) Is the life of the groundhog affected by any of these?
   f) How can we do something to help take care of the groundhog and other small animals kin to it?
   g) Is there something you can do at home or school to help small animals such as the groundhog?

9. Name the methods that changes the habitat of groundhog:
    a) bulldozer
    b) cut underbrush in wooded area
    c) erects buildings such as:
        1. schools
        2. roads
        3. shopping centers
        4. homes
        5. man-made lakes

10. Groundhog's whistle:
    a) What is the groundhog's signal when danger is near?
        Shrill whistle
    b) What does he do besides whistle when danger is near?
        Run for cover -- his burrow, if possible
    c) What does his family do when they hear the shrill whistle?
        Run to safety of burrow

11. How to help these small animals survive.
    a) In towns and cities, people can help small animals. They can set up or develop small areas in different sections where there are trees, grassy areas, and even flower gardens where such things as berry-bearing shrubs, sunflowers, etc., may be planted so birds and small animals could feed on seed and berries. Trees that bear nuts or seeds, if planted, would supply food as well as offer habitats for many animals. Small parks like this placed in different sections could be enjoyed by children as well as small animals.
    b) Assign certain feeding stations to different grades of school children in close proximity so they could share the responsibility of placing foods there at certain intervals through the winter season.

III. VALUE STRATEGIES

A. Sentences to be Completed:

1. The marmot is a ______________________________.
2. The front foot looks like ______________________________.
3. The hind foot looks like ______________________________.
4. Another name a ground hog could be called ____________________.
5. The groundhog's head is ______________________.
6. A burrow is the groundhog's ________________________.
7. A den to a groundhog is ______________________.
8. Groundhog eats ____________________________________.
9. Groundhogs live ____________________________________.
10. Babies in a litter of the groundhog ______________.
11. A groundhog can __________________________.
12. A groundhog can ______________________.
13. A groundhog has sharp ________________________.
14. A groundhog's coat is ____________________.
15. Groundhog Day is ___________________.

B. Value Wheel:

What does a groundhog do all day?
--eats morning and afternoon
-- rests and suns in middle of day.

C. Role Playing:

Pretend you are a groundhog.

- a) What would you do if a fox came in view?
- b) What do you do in winter?
- c) How would you walk?
- d) What do you do to your den every week?
- e) What would you do if you saw a dog or cat?

D. First Impressions:

1. Show pictures of small animals without captions.
2. Let children tell you what each picture means to them.

E. Proud Whip:

I'm proud I learned a groundhog --

1. is a furry animal.
2. has four-toed front feet.
3. has five-toed hind feet
4. lives in a burrow.

F. How Would You Feel If You Were a Groundhog?

G. Contrasting Pictures:

For a groundhog:

- A place to feed
- In the neighborhood
- By the roadside
- A place to play
- The bubbling brook
- Country neighborhood
- In the forest

Discuss why one is best for groundhogs and one is not a good habitat for them.

IV. RESOURCES

Wildlife in North Carolina, July, 1974, pp.4-6, 27.

Film from Charlotte Public Library,

"A Tale of Groundhog's Shadow," 16 mm.

Instructional Films Catalog (1972-73), Charlotte-Mecklenburg Schools.

Filmstrips:

"Animal Homes," 585, 11 min. Shows various kinds of homes found in trees and in the ground and in the water. Includes inside views of homes of squirrel, raccoon, skunk, woodchuck, and woodmouse.

"Animals in Winter," 620, 11 min. Shows various animals as they prepare for winter.

Field trip to Nature Museum to see live woodchuck ( groundhog or Whistle pig.)

Field trip around school or nearby park to look for possible burrow or den of a groundhog.

Funk and Wagnalls Encyclopedia, Vol. 12.

Compton's Encyclopedia, Vol. 6.

Earth Corps, Environmental Awareness Study Unit 2.

First Follow Nature, EAK-2

Basic Primary Science

"Finding out about Things Around Us," A 424-4.

"Finding out how Animals Live," A 424-8.

"Sonny Squirrel and the Pine Tree," A 430-1, Conservation for Beginners.

Ecology -- "The Study of Environment," H.E. and M.S.Schlichting, Steck Vaughn Co., 1971.

Related to Wildlife in North Carolina, Department of Natural Resources, Box 2917, Raleigh, North Carolina, 27601.

Valuing the Environment, A Charlotte-Mecklenburg School Program.

# FEATHERED FRIENDS

Grades 1-2

## I. INTRODUCTION

As man alters the land, builds homes, schools, roads and shopping centers, natural areas are disturbed, destroyed and replaced by urbanization. Habitats suitable for most animal life disappear ....followed by the disappearance of the animals themselves.

Birds, being highly mobile, can continue to live with man, _if_ suitable shelter and food remain. An understanding of bird habits, habitats, and beneficial contributions to man is important, if individuals are going to continue to enjoy urban bird populations.

It is important for children to have a basic understanding of the bird-life found in their community so that they can appreciate not only the birds aesthetic beauty, but the beneficial aspects as well. Likewise students should realize that man has the ability to alter his environment, and not always for the benefit of other living organisms.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the children should be able to:

1. Recognize at least several birds in the community.
2. Know the feeding habits of these birds.
3. Know the nesting habits of these birds.
4. Realize that wooded areas are necessary for nesting and gathering of food.

B. Activities:

1. Take a field walk in the areas around the school ( try to include woods with underbrush, cleared woods, and open fields.)
2. Observe and listen to the bird activity.
3. Discuss where birds were found and identify.
4. Research the type of food needed and where homes are found for each type of bird.
5. Assimilate data and discuss with the children the problems that have been discovered and also possible solutions.

| | Wooded Area | Woods with Brush | Field Area |
|---|---|---|---|
| Types of Birds | | | |
| Food | | | |
| Homes | | | |
| Number Found | | | |

6. Evaluate and adopt a workable solution that can be done by the children. ( e.g. feeders and bird houses.)

## III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you would choose to live in an area that had no birds?
2. How many of you think planting trees would help our birds?
3. How many of you would give up your playground area to plant trees for the birds?

B. Values Continuum:

1. Where would you place yourself in the following:

Clear underbrush for play area

Leave it alone for birds and wildlife

2. Leave cleared wooded area for play

Plant more bushes to attract more birds

## IV. RESOURCES

Filmstrips:

"Birds of Our Community", Society for Visual Education.
"Bird and Animal Babies", Society for Visual Education.
"Birds that Live Near People", Society for Visual Education.
"Looking at Birds", Society for Visual Education.
"Birds," Society for Visual Education.

Study Prints:

Birds, Society for Visual Education.

Book:

Birds of North Carolina, Thomas Gilbert Pearson.

Films:

"Birds in Winter", 11 minutes, black and white, Ency. Brit.
"Bird Homes", 11 minutes, Ency. Brit.
"Life Story of the Hummingbird", color, 16 minutes, Ency. Brit.
"Life Story of the Red Wing Blackbird", color, 16 minutes, Ency. Brit.
"Robin Red Breast", black and white, 11 minutes, Coronet Edu. Films.
"Ruby Throated Hummingbird", color 8 minutes, Coronet Edu. Films.

# CREEPY CRAWLERS

Grades 1-2

## I. INTRODUCTION

People are lords of the earth now -- will they remain that way, or will insects take over? There are half a million insects, with a great number of each kind.

There are insect pests who race people for food, destroy clothing, carry diseases, and destroy our forests farms and shade trees. There are insect friends that help mankind by killing insects that damage crops. If insect friends were to disappear, all members of the 20 or more families of perching birds would disappear, since they feed upon them.

It is important for the children to have a knowledge of the difference and to know what can be done to save the insect friend and destroy the insect pest.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of the encounter, the children should be able to:

1. Recognize helpful insects of the area.
2. Realize how these insects are helpful.
3. Realize that we are responsible for their protection.
4. Understand natural ways to control the harmful insects.
5. Understand why some insects are harmful.

B. Activities:

1. Bring helpful insects to school to observe.
2. Draw pictures of helpful insects.
3. Nature trip to locate insect homes.
4. Make a chart of helpful and harmful insects.
5. Discussion and films on harmful insects.
6. Make a booklet of helpful and harmful insects. Write short paragraph about helpful and harmful insects and pictures.

## III. VALUES CLARIFICATION

A. Rank Order :

1. Which insect would you rather have in your garden?
    a. lady bug
    b. aphid
    c. fly
2. Which bug would you kill first?
    a. roach
    b. spider
    c. mosquito
3. Which insect do you most enjoy watching?
    a. grasshopper
    b. ladybug
    c. butterfly

B. Value Voting:

1. How many of you like to pick up insects?
2. How many like to watch insects?
3. How many would step on insect homes?
4. How many of you would like to have more helpful insects in your yard?

C. Role Playing:
1. Pretend you see a roach in your house. What would you do?
2. Pretend you see a butterfly in your yard. What would you do?

D. Suitcase Value:
If you had to take one insect with you, which one would you take?

E. Alternative Search:
How would you kill a harmful insect?

| Ways | Try It | Consider It | I Won't |
|---|---|---|---|
| | | | |

IV. RESOURCES

Books:
The True Book of Insects, Illa Podendorf.
Britannica Junior Encyclopedia, William Benton, Publisher.
Encyclopedia Britannica
The Golden Book Encyclopedia, Golden Press, Vol. VIII, New York.

Films:
"Insects in a Garden," EBF, P 309.
"Insect Enemies and their Control," Coronet, P 222.
"Insects," EBF, 172, P 122.

# ANIMALS DEPEND ON PLANTS

Grades 3-4

## I. INTRODUCTION

All animals depend on the living as well as the non-living environment for survival. An animal's habitat is where it finds in the environment the "essentials of survival" --water, food, cover and a place to raise its young. For many animals, plants provide three of the four essentials of survival. Plants provide animals with food, cover, and a place to reproduce. But plants also need animals. We call this mutual dependence or interdependence.

Man's activities, by greatly affecting urban vegetation, limit habitat diversity available to animals in the city. The clearing of the underbrush, paving of fields, stripping the land of trees, polluting the air, all alter animal habitats. When green areas are altered, animals which depend on that area for food, shelter, and water, must migrate or die.

Mammals and birds in the city may be grouped into three broad categories: (1) those species adapted to life with man and at least partly dependent upon him for food, cover, and nesting sites, (2) those that tolerate man and (3) those that shun man; i.e., the forest, grassland and desert species for which small units of habitat available in the city are usually inadequate.

Birds adapted to a life dependent on man are the pigeon, starling, English sparrow, nighthawk, chimney swift, and herring gull. Mammals include Norway rats, house mice, cats and dogs. However, a far greater number of vertebrates "tolerate" man and take advantage of man's activities, including farming activities. This group includes the blue jay, robin, woodpecker,cardinal,crow, grackel, flicker, meadowlark, gray fox,and opossum.

Except for pests such as the rat, house mouse, and the English sparrow, little study has been devoted to the behavior of animals and birds in the city.

The starling, a pesty bird from Europe, requires the same habitat as the bluebird. Because the starling finds it easier to adapt to man's activities, bluebirds are rare in cities. The bluebird is being severely threatened.

Because animals are interdependent, severely reducing the number of one species of animal can affect the population of another with serious results. Cats in a South American town were killed because they were disease carriers. The result: proliferation of the rat population which carried even more serious diseases, such as, Chagas' disease.

Because of this interdependence, the diversity of wildlife in the city is important to avoid calamity. Home owners, industrial firms and city government can consciously provide the vegetation needed for food and shelter for wildlife. There can be a balance of nature in the city if man chooses not to destroy it.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the conclusion of a successful encounter, students should be able to:

1. Describe how living organisms are dependent on a particular environment.
2. Demonstrate that the more plants there are in an area, the more animals will be found.
3. Explain the effect of man's disruption of habitat on plants and animals
4. Explain why we must encourage protection of green areas in the cities.

B. Activities:

1. Secure a map of the school grounds.
2. Inventory the "green" areas ( areas of abundant plant life), animal homes and unproductive areas ( school buildings, parking lot, widewalks, "sand lot," etc.).
3. Select two areas of the same size; one in a woods with undergrowth and one in woods lacking undergrowth ( grassy area versus playfield may be used as an alternate.)
4. Collect at random insects from both areas for weighing ( be sure to keep the collections of both areas separate). You may want to identify the insects as "plant eater" and "animal eater".
5. Compare the total weight of the insects in each area. More plant life should support more animal life.
6. Study the data to determine needs, if any, to encourage helpful animals to return.
7. Recommend a plan of action (poster contest, Arbor Day activities,etc.)
8. Implement the plan with individual or class activities.

## III. VALUES CLARIFICATION

A. Values Voting:

1. If you had a woods next to a city park, how many would prefer to play in the woods?
2. How many enjoy seeing many birds and other animals in a field or woods?
3. How many have ever planted a tree or shrub?
4. How many have ever placed a feeder, shelter, or bird house near your home?
5. How many have removed the brush from under trees in your backyard or neighborhood?

B. Autobiographical Questionnaire:

Have you ever:

1. Helped to clear shrubs from under trees in a woods? ( 70% of wildlife live within the first ten feet from the forest floor up).
2. Throw paper and other trash on the ground or in water? ( Litter is ugly and sometimes dangerous to animals).
3. Planted sunflower seeds? ( food for birds and other small animals).
4. Looked for insects and other animals under a log and forgot to turn it back over? (Animal homes are destroyed and moisture lost).

## IV. RESOURCES

Books:

Concepts in Science, Brandwein, Cooper, Blackwood, Harcourt, Brace & World, 4, 1969.
Basic Concepts of Ecology, Clifford Knight ( for teacher).
People and Their Environment, Grades 4-5-6, Matthew J. Brennan, Editor, Ferguson Publishing Company, 1972 (for teacher).
Acclimatization, Steve Van Matre, American Camping Association,1972 (for teacher).
Ecology: The Forests and Man, George McCue, Benziger, Inc.,1971.
Ecology, George McCue, Benziger, Inc., 1971.

Filmstrips:
"Exploring the World of Nature Series", Society for Visual Education.
"Let's Explore a Field". A423-1.
"Let's Explore a Garden", A423-2.
"Let's Explore a Lawn", A423-3.
"Let's Explore a Pond", A423-4.
"Let's Explore a Stream", A423-5.
"Let's Explore a Woodland", A423-6.

Kits:
Environmental Action: No Time to Waste.
The Creative Teacher, 1971.

Pamphlet:
*How to Read the Natural Landscape in Forests and Fields*, Millard C. Davis, NSTA Publication, 1971.

# NATURAL FOODS

## Grades 3-4

I. INTRODUCTION

"In a world gone mad with pesticides, defoiants, herbicides, growth pills ( for both animals and plants) and innumerable other 'aids' to food production ..." there are voices expressing concern for our increasingly synthetic world of foods. An English agricultural advisor in India more than 40 years ago, partly out of necessity, but primarily out of concern for preserving natural cycles of life by returning plant and animal wastes to the soil, proposed growing plants and husbanding animals without using synthetic chemicals.

Natural foods, foods grown "organically," a term coinced by J.I.Rodale in the late 1930's to describe the natural method of farming, are more appetizing, more nutritious, and more compatible with a natural way of life.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of a successful encounter, the child should be able to:

1. Describe the benefits of natural foods.
2. Discuss benefits and limitations of organic farming.
3. Discuss healthful food versus trash food.
4. Explain value of fresh foods and unpeeled foods.
5. Discuss wasted food.
6. Identify edible foods on the school grounds.

B. Activities:

1. Explore the school grounds. Look for natural edible foods. How do these foods differ from foods we eat daily? Why do we grow foods in exposed fields, rather than relying on nature to provide foods? Make a display in the classroom showing the types of edible foods found on the field trip.
2. Contact the N.C.Cooperative Extension Service. Ask for materials on farming, including organic farming. If possible, have an organic farmer explain how food can be grown without using synthetic fertilizers, insecticides, or herbicides.
3. Visit a grocery store. Observe the types of food available. Note types of processing. Read the labels on prepared foods. What ingredients appear to be natural, which seem to be synthetic? Why are the synthetic materials added? Write companies requesting an explanation of specific food additives listed on packages.
4. Write to the U.S.Food and Drug Administration: Public Information Officer. Request information on food additives. Ask specific questions regarding additives you have seen listed on packages of food you eat.
5. Examine different forms of processed foods in the classroom. Discuss how the foods were prepared. Discuss peeling of vegetables. What happens to peelings and other organic wastes? Could they be composted?
6. Bring in a stalk of wheat. Use this to compare white bread and brown bread. Discuss these questions: a) What causes the color in the bread? b) What part of the grain would have more food value? c) What part of the grain is used? d) Where do we get wheat germ? Display the types of grain available as well as some products from these grains, including wrappers, boxes, etc.

7. Have students draw a picture of the lunch they would select from the Basic Four. Discuss why they think it is a good lunch. Discuss meal planning, nutritional needs, new foods, meat substitutes, etc.
8. Display good and"trash" snacks and compare the items. Examples: coke - juice; cookie - fruits. Plan and actually prepare a good snack at school. Examples; Cookies using special ingredients as peanut butter, wheat germ, coconut, nuts or dried fruits.
9. Discuss vitamins ( minerals) in foods. Discuss vitamin loss by overcooking, using too much water in cooking, etc.
10. Make a collection of nutritional recipes. Prepare some of the recipes in the classroom at school. Examples: Make peanut butter (Good Earth Almanac). Toast pumpkin seeds.
11. Keep a food diary for five days. At the end, check the days you ate food from each of the four basic groups.
12. List 10 snacks. Vote according to best food values. Include milk, coke, green celery, whole wheat crackers, peanut butter, ice cream, cookie, fruit (apple), candy bar, popcorn.
13. Trace the items listed below as to source. Discuss synthetic additions to the food at each step.

grits
flour
milk
cottage cheese
hamburger

## III. VALUES CLARIFICATION

A. Values Decision:

1. I would be able to eat

| | All | Some | None |
|---|---|---|---|
| Nuts | | | |
| Mushrooms | | | |
| Wild fruits | | | |
| Roots | | | |

B. Values Voting:

1. I would eat unpeeled carrots.
I would always carry peelings to compost pit.

C. Rank Order:

1. Rank 1, 2, or 3 as to vitamins.

Fresh spinish_____
Canned spinach_____
Frozen spinach_____

Orange _____
Orange juice _____
Orange drink_____

## IV. RESOURCES

Books:

Algae, Schlichting, H.E. and M.S., Stech-Vaughn, 1970.
Toadstoals and Such, Russel, Solveig P., Steck-Vaughn, 1970.
Science Experiments You Can Eat, Cobb, Vicki, J.P.Lippincott Co., Philadelphia and New York, 1972.
Good Earth Almanac, Universal Press Syndicate, 1973.
The Basic Book of Organic Gardening, Rodale, Robert, Ballantine Books, Inc., 1971.
Edible Wild Plants, Fernald, Merritt Lyndon and Kinsey, Alfred Charles, Harper and Row, 1958.

Filmstrips:

"A Visit to a Garden," Encyclopedia Brittanica.
" The Wonderful World of Plants," Society for Visual Education.
"Food Makes History," Popular Science, black and white.
"Foods for Health," Y.A., color.

Films:

"Where Does Our Food Come From?", color, 16 mm, 11 minutes, CORF.
"The Food Store," color, 13 minutes

### Whole Wheat Molasses Cookies

Bake at 350 degrees for 7 minutes. Portable oven works well.

½ c. butter or margarine
¼ c. sugar
¼ c. molasses
½ t. salt
2 t. soda
1 t. each ground giner, sinnamon
¼ t. ground cloves
1½ c. whole wheat flour
2 T. vinegar

Melt butter with sugar and molasses in small sauce pan. Cool. Add flour and spices, then vinegar. Drop by teaspoonfuls onto greased cookie sheet. Bake.

### Zippy Toasted Pumpkin Seeds

2 c. pumpkin seeds
2 T. Worchestershire
2 T. butter, melted
2 T. grated parmesan cheese
Salt

Mix all ingredients; put in jelly roll pan. Toast at 375 degrees about 15 minutes. Stir every five minutes.

### Arab Dates

½ c. honey
½ c. chopped toasted almonds
¼ c. chopped candied citron
½ c. chopped walnuts
1 lb. pitted dates

Mix first four ingredients. Stuff dates with mixture; roll in sugar; store air tight.

# SAY HELLO TO A TREE

Grades 3-4

## I. INTRODUCTION

Trees are the most conspicuous and best known plants. They are important to all living organisms in a variety of ways. To many animals, trees provide food and shelter. To most animals, trees supply oxygen for their very breath. Further, the root system of trees aid in the prevention of soil erosion thusly, saving the rich topsoil for other plants and disallowing sedimentation of streams. When the trees shed their leaves in autumn, they protect and add energy back into the soil. They cause wind to slow down and walk. How long will we be able to say hello to a tree?

As our nation's population skyrockets, the demand for lumber in construction of houses, shopping centers, industrial buildings, offices and textile mills rises. At present, only one-third of our nation remains covered by forests and the supply is diminishing rapidly.

North Carolina has a total of 31.3 million acres of land with twenty million in commercial forest land of which one-third of them are planted in pines with the remaining land planted in hardwood, i.e. oaks, hickories. In fact, the climate and soil of North Carolina favors more than one-hundred commercial species of trees, more than any other state in the nation. With proper management and care, hybrid trees, recycling, insect control, and fertilization, North Carolina forests could create new jobs for our expanding population, i.e. increased furniture building and recycled paper products.

Presently, however, this is not what is happening. An example of this is the fact that generally only four trees are planted for every five cut down. Further, to provide sufficient pulp, 840 rolls per week, measuring 720 miles long, and 840 tons in weight, for the Charlotte Observer more than 390,000 trees have to be cut each year. What if we were to recycle these papers? For every ton recycled, we could help save North Carolina trees.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the completion of a successful encounter, the student should be able to:

1. List several uses of trees.
2. Realize the importance of a single tree.
3. Be aware of the necessity of tree conservation for future generations.
4. Value the aesthetics of the forests.

### B. Activities:

1. Take a walk around the school ground. Observe the diversity of tree sizes, colors, barks, and types.
2. Divide the class into groups. Suggest that each group decide some study they would like to make concerning trees. For example, they may choose to make pictures, leaf collections, sketches of items made from trees, tree farming or christmas tree farming.
3. Ask the children to pretend they are trees. Ask each child to decide what kind of tree he will become and how he might grow from a small tree to a large tree. You might have the children act out the growth of the tree they have chosen.
4. Show the film, "Our Forest--Learning About Conservation."

5. Illustrate the importance of your favorite tree. For example, list as many uses of this tree as you can.
6. Plant a tree on the school campus on Arbor Day.
7. Observe a loblolly pine and discuss why it was choosen as North Carolina's state tree.

III. VALUES CLARIFICATION

A. Values Voting:

1. Do you think that there are enough trees to last forever?
2. Would you like to live in a world without trees?
3. Do trees create a feeling of beauty?
4. Do you enjoy the shade of a large tree in the summer?
5. How many of you would plant a tree?

B. Role Playing

1. I am a broken tree limb, how do I feel?
2. I am a new pencil in a pencil sharpner; how do I feel?
3. I am a christmas tree; what am I thinking?

C. Baker's Dozen:

List thirteen items made from a tree. Circle three that are most important to you. Put an X by the ones you can do without.

IV. RESOURCES

Books:

Concepts in Science, Brandwein, Cooper.
The Giving Tree, Shel Silverstein.
Guiness Book of World Records, Norris, Ross McWhirter, 1973.
Teacher's Guide for Environmental Education, North Carolina Public Instruction, 1970.
People and Their Environment, Edited by Matthew Brenman.

Filmstrips:

"Our Forest Learning About Conservation," Coronet Film with record.
"Let's Explore a Woodland," SVE, color.

# WILDFLOWER POWER

Grades 5-6

## I. INTRODUCTION

The native flowering plants of a region are its wildflowers. They originate there and grow wild year after year under natural conditions if they are undisturbed by man. They may be found in woods, fields, deserts, jungles, meadows, and swamps, on mountains, prairies, and roadsides, and along streams and seashores.

Western North Carolina and the Appalachian Region has one of the richest accumulations of plants in the world. The Southern Appalachian Mountains has been called the vegetation cradle of eastern North America. This region displays in profusion wildflowers common in much of eastern North America. In the Great Smoky Mountains National Park, half of which is in North Carolina, there are over 1,500 flowers, plants and about 800 different kinds of wildflowers. There are several reasons for this: 1) abundant rainfall, 2) different habitats available, and 3) favorable climate.

The best way to learn about wildflowers is to go to the regions where they grow and become involved in the environment. Wildflowers are protected, together with other forms of wildlife, by the establishment of national, state and local parks, forests and sanctuaries. The Wildflower Preservation Society in Washington, D.C.makes the following suggestions:

1. Do not pick or dig up wildflowers in quantity unless they are abundant.
2. Some species will not bloom again if the leaves are picked with the flowers.
3. Other species may be picked if the roots are not disturbed.
4. Rare wildflowers should never be picked.

Citizens should be careful when picking wildflowers as they may destroy whole plants or prevent other people from enjoying their beauty. As an old time ranger said, "Take nothing but pictures, and leave nothing but your footsteps."

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the completion of a successful encounter, the children should be able to:

1. Appreciate the aesthetic value of nature, especially through wildflowers.
2. Be familiar with wildflowers in their community.
3. To distinguish between domestic flowers and wildflowers.
4. Describe wildflower anatomy.

### B. Activities:

1. Have students become knowledgeable on a wildflower of their choice.
2. Have students make charts of several wildflowers ( in vivid color and detail) common to your area.
3. Examine wildflowers under a microscope and become familiar with the parts of a flower.
4. Take a walk around your school and look for wildflowers. Discuss the domestic and wildflowers that you saw.
5. Establish a garden on the school grounds using seeds from wildflowers.

6. Invite a guest botanist or a member of a local garden club to speak to the class on wildflowers ( perhaps someone from the community makes wildflowers a hobby.)
7. Complete Dot Game. ( See attached Dot to Dot) Hand out.
8. Send for information from the Wildflower Preservation Society.
9. Have the students make their own slides of a wildflower of their choice. Present the slides to the class.
10. Preserve some wildflowers.

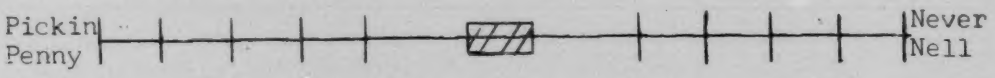
## III. VALUES CLARIFICATION

A. Values Voting:

1. How would you like to live in a community where there are no green plants?
2. Does the color yellow cheer you up?
3. Do you notice the natural environment when you ride in a car?

B. Continuum:

When you pick flowers are you?



Pickin Penny picks all the wildflowers she can find. Never Nell never picks wildflowers; she enjoys just looking at them.

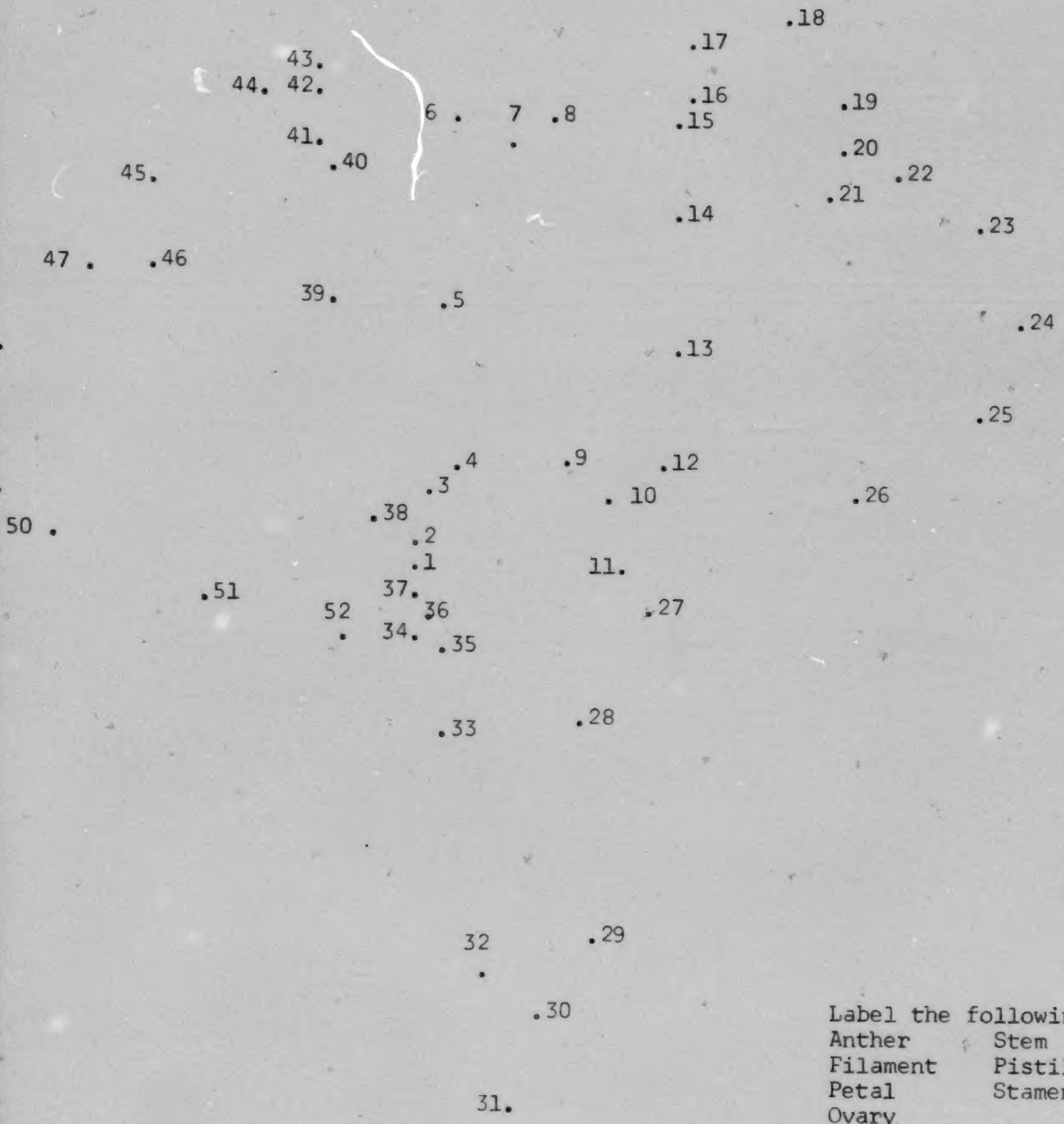
C. Magic Box:

Have a student pretend there is a wildflower in the box. Give characteristics of the wildflower and have other students guess the wildflower in the magic box.

D. I Learned That:

1. I realized that ____________________.
2. I was surprised that ____________________.
3. I was pleased that ____________________.
4. I was not pleased that ____________________.
5. The most interesting fact was ____________________.
6. The new thing I learned that ____________________.
7. I noticed that ____________________.

# Dot to Dot



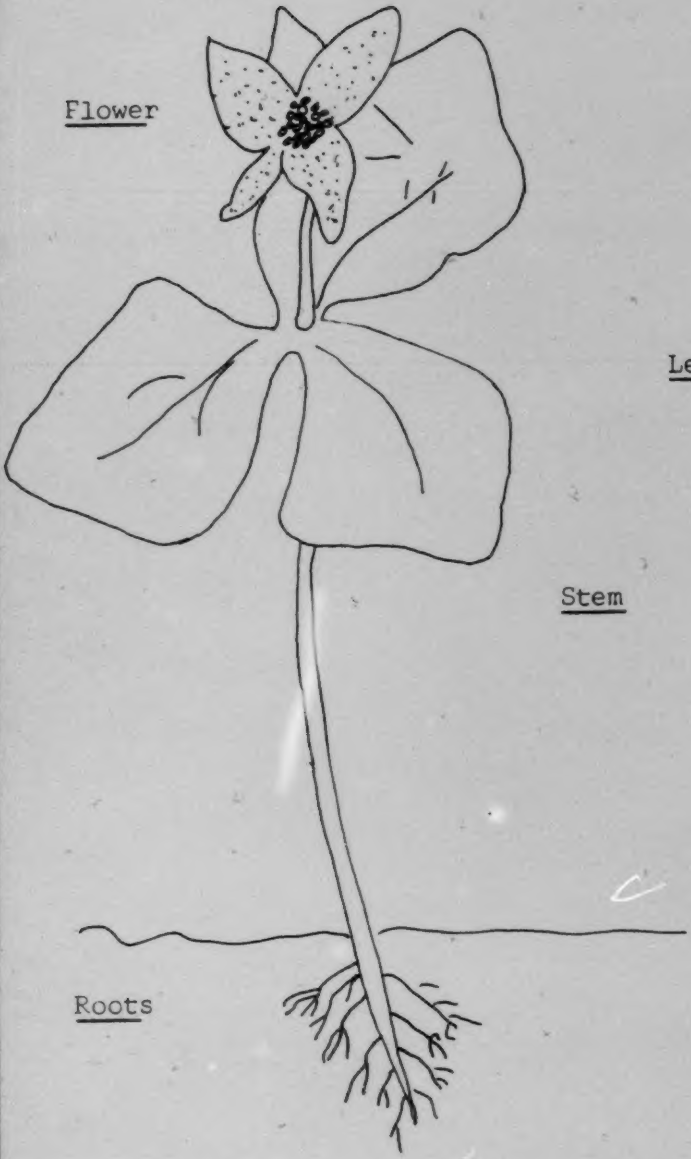
Label the following:

Anther
Filament
Petal
Ovary

Stem
Pistil
Stamen

Flower Power
Environmental Education Center, Oteen, North Carolina.

THE ANATOMY (PARTS) OF A WILDFLOWER



| | |
|---|---|
| Flower | (Produce seeds<br>(Attract insects |
| Leaves | (Manufactures food<br>(Releases oxygen<br>(Absorbs carbon dioxide |
| Stem | (Transport water,<br>(minerals and food<br>(Supports plant |
| Roots | (Anchors plant<br>(Absorbs water and<br>(minerals<br>(Stores food |

## IV. RESOURCES

Books:
*Wildflowers in Color*, Arthur Stupka, Harper and Row, New York, 1965.
*Flower Power*, Alan Lenk, ESEA Title III Project, Madison County.
*The Forest and Man*, George McCue, Benziger, Inc., New York, 1971.

Filmstrips:
"Flowers, their parts and functions," SVE, color, 62 frames.

Films:
Flowering Plants and Their Parts.

# SAVE OUR SNAKES

Grades 5-6

## I. INTRODUCTION

Reptiles and amphibians are useful and helpful to man in several ways. Reptiles feed on rats, mice, gophers, insects and other pests. Turtles are important as scavengers. Frog-legs are a delicacy in some parts of the world and turtle eggs are also used for food by man. Laboratories use many frogs in research and study. These animals are important in the balance of nature and should not be killed indiscriminately.

Reptiles were in their heyday millions of years ago when dinosaurs ruled the world. Now the reptiles we have are only a remnant of the once-great group of animals. No other group has more curious or more unusual members. They are interesting as a reminder or link to the past. No group is more misunderstood, disliked, and feared. Reasons why reptiles are feared are because some are poisonous and others are man-eaters. These few give the others a bad name. The poisonous ones and the man-eaters are dangerous, but usually do not attack man unless teased, surprised or cornered.

The four groups of reptiles are:

1. The Chelonia: turtles,tortoises and terrapins.
2. The Crocodilia: crocodiles, alligators and tuatara.
3. The Rhynchocephalia: the turtles.
4. The Squamata: lizards and snakes.

Reptiles have backbones and ribs; they breathe air through lungs; they are cold-blooded, and have rough scaley skins.

In the United States there are only four poisonous snakes and one poisonous lizard -- the gila monster of the southwest. The snakes include the coral snake, the rattlesnake, the copperhead, and the water moccasin. The rattlers, water moccasin and copperhead are pit vipers, which have a pit between the eyes and nostrils. The coral snake has color similar to the harmless scarlet king snake. Of the thousands of people in the United States bitten by poisonous snakes, as few as twenty-five die yearly.

Amphibians are called the "in-between" animals because they were the first animals millions of years ago to come out of the sea and spend part of their lives on land. These animals are the ones from which all reptiles, birds and mammals came. "Amphibian" means "double-life". Today our amphibians are much weaker and smaller, but they still lead a double life. Most begin life in the water and breathe oxygen from the water through gills. Later, lungs develop and the adult lives on land and breathes oxygen from the air.

These are three main groups of Amphibians:

1. The Caecilians which are like worms.
2. The Salamanders and Newts.
3. The Frogs and Toads.

Many tall tales have been told and many superstitions have grown up around these two groups of animals. Warts are not caused by handling toads. No snake can roll itself into a hoop and roll along or shoot himself like a dart.

Cows certainly would not allow snakes to milk them as some people believe. As facts become more widespread, many of the fears and much of the misunderstandings vanish.

Because the skin of alligators is useful for leather in making belts, shoes, and purses, and because small alligators have been sold for pets, these animals are threatened with extinction.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of a successful encounter, students should be able to:

1. Name several reptiles and amphibians and the characteristics of each group.
2. Give a couple of reasons why these animals are often feared and misunderstood.
3. Name a reptile or amphibian that is endangered and explain why.
4. Develop several food chains showing interdependence of amphibians and reptiles.
5. Be able to describe the four poisonous snakes in the United States and tell where they are found.
6. Name as many uses as you can of these animals to man.

B. Activities:

1. Make a terrarium and keep a record of food eaten by the animals.
2. Take a walk around the nature trail and look for amphibians and reptiles. Keep notes of where seen and what the animals were.
3. Draw and color the four poisonous snakes found in the United States. Compare the color pattern of Scarlet, King, and Coral snakes.
4. Debate: Reptiles and amphibians are important to man.
5. Visit Nature Museum -- observe reptiles and amphibians.
6. Research alligators -- why endangered.

## III. STRATEGIES FOR VALUES CLARIFICATION

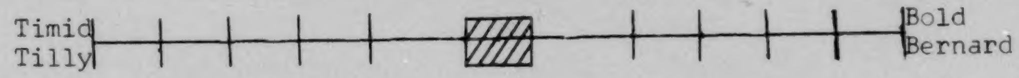
A. Role Playing:

Each student chooses an amphibian or reptile he wants to be. He finishes these sentences: I am ____________________ I help man by ____________________. I do not want to be ____________________ because ________________________________________.

(Explain the game after names are chosen.)

B. Continuum:

Timid Tilly is so afraid of snakes that she believes every snake seen should immediately be killed. Bold Bernard likes snakes and believes everyone -- even poisonous ones -- should be protected and kept alive. On a Continuum, where would you place yourself?



C. Values Voting:

1. I'm afraid of snakes.
2. I'm afraid of poisonous snakes.
3. I like to buy alligator skin products.
4. I think it's wrong to use frogs for laboratory experiments.
5. I believe toads cause warts and should be killed.

## IV. RESOURCES

Books:

Exploring and Understanding Amphibians and Reptiles, George R. Otto, Benefic Press, 1968.

Reptiles and Amphibians, Herbert Zim and Hobart Smith, Golden Press, 1956.

Zoology, R. Well Burnett, Harvey I. Fisher, and Herbert S. Zim, Golden Press, 1958.

People and Their Environment, Matthew J.Brennan, J.G.Ferguson, 1972.

Ecology, George McCue, Benizer, 1971.

Study Prints:
Reptiles and Amphibians, SVE.

Filmstrips:
"Frogs, Toads and Turtles," SVE
" Snakes and Lizards You Should Know," SVE.

# INTERDEPENDENCE OF LIVING THINGS

Grades 5-6

## I. INTRODUCTION

Can you imagine what this world would be like if all life was destroyed except for one group of organisms? What group could survive without the support of any other living organism? You may decide upon green plants as your answer, but could green plants survive long without the insects for pollination? What about plants depending upon animals for seed dispersal? What about the need for animals, such as earthworms, moles and ants to keep the soil aerated? When plants such as algae use all the available nitrogen compounds, what would occur? Think about the important role that nitrogen fixing bacteria perform by replacing nitrogen compounds that have been used by plants and animals. When plants mature and eventually die, it is the small microscopic animal life, such as bacteria that help to decompose and break-down various chemicals and return the nutrients back to the soil. It is also important to remember that animals as they feed upon other plants and animals return carbon dioxide and water back to the environment which plants use during the process of photosynthesis. Without this interdependency and recycling of materials, much of the life on earth would cease to exist.

The producers, green plants, cannot live alone. They must depend upon consumers for their survival. Consumers are both animals and saprophytic plants. The decomposers are essential for the return of nutrients back to the soil to be reused again by plants and animals. Therefore it is important to note that all living organisms, including people, are interdependent and interrelated, and our activities or programs affecting the environment must be responsive to this concept if we are to survive.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Know the value of all living organisms in maintaining the balance in nature.
2. Know that living organisms take matter from the environment and return matter to the environment.
3. Realize how important producers are in relation to the land ethic and providing for animals from the most minute to the largest.
4. Recognize how saprophytes, i.e. molds, yeast, and bacteria, depend upon other organisms for food (energy) because they lack chlorophyll.
5. Realize that predation in nature is an important means for maintaining a balance, and that producers must outnumber consumers.
6. Realize that the environment is in a constant state of change, and that people are now the key contributors to that change, which is not always to the benefit of the environment.

B. Activities:

1. Read your local newspaper and look around your community to locate a healthy ecosystem, a recently destroyed ecosystem, and an ecosystem which can be rescued from destruction. Discuss with students what impact they can have on each.
2. Establish small ecosystems in the classroom for observation. Use aquariums, terrariums, and insectariums. A tiny ecosystem in a test tube can be made by corking an aquatic snail and a green water plant. The ecosystems do not necessarily have to be balanced to be a learning situation.

3. Research the environmental decline of Lake Erie. Is it dying? If so, why?
4. Research why starfish are over-producing and sea snails are declining.
5. Research how insecticides, such as DDT, have upset the web of life in some areas, and contributed to the increase of endangered species.
6. Consider doing some of the following mini-field trips around the school:
    a. Study a tree carefully and list all plants and animals that are on it, beneath it, and around it. After returning to class, discuss the number of interrelationships and make food webs of this small ecosystem.
    b. Examine a hedge or vine growth on a fence to determine the producer, consumer, decomposer relationships.
    c. Examine a tree stump for interrelationships.
    d. Examine a leaf or compost pile. Look for white thread-like fungi (decomposers), green plants ( producers), and animals (consumers). What is the soil relationship?
    e. Examine a board or log that is in the process of decay. Take an animal census and determine who is the eaten and who is the eater.
    f. Look for examples of mutualism ( two organisms have a relationship that is beneficial to each other). For example: Alfalfa, clover, vetch, beans, peas, and peanuts have special bacteria that live on their roots in nodules and take nitrogen from the air converting it to nitrogen compounds which plants can use. The bacteria utilize some of the food produced by the plant and in return give the plant the needed nitrogen compounds to make protein.
    g. Additional activities may include finding examples of: soil building, man altering the environment, wise cutting of trees, erosion, and natural animal shelters.
7. Observe the interrelationships of insects and flowers. Some insects feed on pollen and some on nectar. Bees are the best pollinators. Digger wasps eat nectar and their larvae eat grasshoppers which are a garden pest. Without bees, butterflies, moths, etc. to pollinate, much of the plant food would be limited to grass or only those plants that can self-pollinate or be pollinated by the wind.

II. VALUES CLARIFICATION

Rank Order:

1. Place the following in the order that you would prefer to be:

a. ____grasshopper
____lady bug
____ant
____preying mantis
____butterfly

b. ____honeybee
____boll weevil
____aphid
____bag worm
____clothes moth

2. If you could be a plant, in what order would you choose to be:

a. ____apple tree
____crab grass
____poison ivy
____oak tree
____jonquil

b. ____honeysuckle
____pine
____rose bush
____shelf fungi
____fern

Values Rating:

1. Choose an animal from the following and put its name on the chart below: snake, cat, rat, snail, honeybee, people, yourself, blue jay, humming bird, rabbit.
2. Choose a plant from the following and put its name on the chart below: clover, venus fly trap, corn, oak tree, mushroom, algae, pine tree, poison ivy, lichen, tulip.

Good ________:________:________:________:________Bad
Valuable ________:________:________:________:________Worthless
Clear ________:________:________:________:________Dirty
Strong ________:________:________:________:________Weak
Hard ________:________:________:________:________Soft
Rugged ________:________:________:________:________Delicate
Ferocious ________:________:________:________:________Peaceful
Fast ________:________:________:________:________Slow
Hot ________:________:________:________:________Cold

C. Word Association:

Show students several pictures of plants and/or animals and have them write down within five seconds three words that come to mind. After listing the words for all pictures, ask for volunteers to give their words and an explanation.

D. Values Wheel:

Draw a circle and divide it into three parts. In a small ecosystem on the school grounds determine the percentage of producers, consumers, and decomposers that you can see and place the percentages in the wheel. Discuss the reasons for the variation.

E. Continuum

Where on the continuum would you place yourself as to the importance of producers or consumers.

F. Value Survey:

Give the students a list of eighteen organisms that include producers, consumers, and decomposers. Make sure that they are arranged in alphabetical order. Tell the students to rearrange them in an order that is important to them as affecting their life. This strategy can be incorporated into a "scavenger hunt" on the school grounds nature trail. Points can be given for those organisms that are found, and subtracted from the total for anything that the students damage.

IV. RESOURCES

Films:

The Ecosystem: Network of Life, BFA, 16 mm., color, 11 min.
Life in a Vacant Lot, EBEC, 16 mm., color, 10 min.
The Honeybee, EBEC, 16 mm., black & white, 11 min.
Social Insects: Honeybee, EBEC, 16 mm., color, 24 min.
The Ecology Primer, Amer. Edu. Films, 16 mm., color, 18 min.

Filmstrips:

"Dependent Plants", SVE
"Mushrooms", SVE
"Exploring the World of Nature", series of 6, SVE

Kits:

"Our Environment Problem or Promise?", A. J. Nystrom & Co., 1972.
"First Follow Nature", Scholastic Educ. Services.
"Sharing the Earth". Scholastic Educ. Services.
"Environmental Awareness Kit", Environmental Education Center.

Games:

"Make Your Own World", Coca-Cola Ecology Kit, 1971.

Books and Booklets:

Ecology, George McCue, Benzieger, Inc., 1971.
Ecology: The City, George McCue, Bensieger, Inc.,1971.
Ecology: The Forests and Man, George McCue, Bensieger, Inc., 1971.
Ecology: The Freshwaters and Man, George McCue, Bensieger, Inc., 1971.
Ecology: The Suburbs, George McCue, Bensieger, Inc., 1971.
Ecology: The Study of Environment, H. E. Schlichting and M. S.Schlichting, Steck-Vaughn Co., 1971.
Toadstools and Such, Solveig Paulson Russell, Steck-Vaughn Co., 1970.

Posters:

"Ecology: Ecosystems", Teaching Pictures with guide, David C. Cook Publishing Co., 1973.
"Ecology: The Pollution Problem", Teaching Pictures with guide, David C. Cook Publishing Co., 1972.

# MUDDY RAINDROPS

Grades K–2

## I. INTRODUCTION

Erosion is the process where the features of the earth are changed by rainfall, wind, and any other agent that breaks down the soil and rocks. Because of the consistency of the soil in Mecklenburg County ( typically red clay), water is not easily absorbed. The heavy runoff results in erosion. The degree of erosion depends on vegetation, the slope of the ground, and the use of the existing terrain; i.e., land under construction.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

Following a successful encounter, students should be able to:

1. Recognize when and where erosion has taken place.
2. Understand what happens when erosion takes place.
3. Describe simple methods to control erosion such as planting grass, rocks, terracing, etc.

B. Activities:

1. Field trip to school yard to discover erosion.
2. List and locate eroded areas on school map.
3. Plant grass in one area to show control and leave another eroded for later comparison and record on the chart below.
4. Build a rock terrace in another area to show control.

Areas on Compus Studied

| | Grassed | Rock | Unclaimed |
|---|---|---|---|
| 1st Week | | | |
| 2nd Week | | | |
| 3rd Week | | | |

5. What conclusion can we reach after our collected information?
6. Evaluation of a solution. Did the grass help? Was the rock terrace sufficient?
7. Follow through with solution. Select the best method and fix the eroded areas.

## III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you would like to have a grassed playground?
2. How many of you like to play in the mud?
3. How many of you would drink muddy water?
4. How many of you like to see water running down an eroded hill?

B. Rank Order:

1. Rank in the order that you would prefer to play during your play period.
    a. Hardtop playground.
    b. Mud playground.
    c. Grassed playground.
2. If you saw erosion on a little hill, rank in the order that you would correct the erosion.
    a. Plant grass.
    b. Use gravel.
    c. Terrace

IV. RESOURCES

Films:

"Your Friend the Soil: Keep It or Lose It", color, 6 minutes, Ency.Brit.
"Water, Water Everywhere", 11 minutes, Ency. Brit.
"The Soil and Life", color, 14 minutes, UW:F.

Filmstrips:

"Soil and Water Conservation", Heath.
"The Muddy Raindrops", Society for Visual Education.
"The Lamb and the Bluebells", Society for Visual Education.
"The Meaning of Conservation", MEHT.

Pamphlets:

The Soil That Went to Town, (free from local Soil Conservation Office).

# A CUP OF GOLD ( WATER CONSERVATION )

Grades 3–4

## I. INTRODUCTION

Water is one of our most valuable resources. Each one of us can help save it by a very simple action -- use only as much as you need. Because water has been cheap for so long, most of have developed bad habits when it comes to using water. We can really get by with using less.

If we conserve water, we can relieve the demands on our purifying plants which the United States Senate Committee reports that we must spend 1.7 billion a year to keep up to acceptable health standards.

Unfortunately, our present way of life contributes to waste and pollution.

Our factories, cities, homeowners, and everyday appliances all waste water and put burdens on purifying stations.

We borrow water from the water cycle and it should be returned to that cycle in as pure a form as possible.

By borrowing less from the cycle, we can reduce pollution and reduce our demands on water treatment facilities.

When you include the water required to grow the food you eat and the clothes you wear, it takes 2,500 gallons of water to maintain our adult life each day.

It takes 150 gallons to make one Sunday newspaper, 650 gallons to make the steel for one bicycle, 75 gallons to grow one ear of corn, 200 gallons to make the rubber for one car tire, 10 gallons to wash dishes, 3 gallons to flush a toilet, 20 to 30 gallons for a shower bath, 30 to 40 gallons for a tub bath, and 20 to 30 gallons to wash a machine load of clothes.

The city of Charlotte provides about 60 gallons a day for each person's use in the home.

Two million Americans seek water for recreation. Outdoor recreation is a vital American way of life.

It is true that we have great reserves of water in this country -- but not enough to allow us to continue misusing this resource.

Today's water is the only water that will be available for the future. There will be no more of it tomorrow than there is at present. What mankind does with this precious resource will determine whether there will be sufficient usable water for our children and their children.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the end of a successful encounter, the child should be able to:

1. Explain the water cycle.
2. Explain how nature purifies water.
3. Visualize the amounts of water each person uses and encourage conservation practices.
4. Appreciate the small savings of water by individuals compared to the savings of the total population of this county, country, and neighborhood.
5. Become more aware of the beauty around them and see the necessity of water to keep these things available.
6. Develop the concept of the interdependence of each person in its use and conservation of our natural resources.
7. Become aware that the wise use of resources tends to insure availability, and economics to each user.

B. Activities:

1. Draw pictures showing the water cycle.
2. List ways of saving water.
3. Give problems showing population and how much water each family can save. (Example: Each family saves 3 gallons per person, how much is saved?)
4. Make collections of water and let stand. After a couple of days evaluate each jar according to the chart below:

| | Color | Smell | Drinkable | Debris |
|---|---|---|---|---|
| Rain water | | | | |
| Ditch water | | | | |
| Lake or river water | | | | |
| Drinking water | | | | |

5. Duplicate nature's way of filtering water by using the Water Testing Kit.
6. Measure to see which uses more water -- shower or bath. Use masking tape in tub to show line of water used. Be sure to close stopper when showering.
7. Chart these -- water makes these things available for me:

| Plants | Animals | Foods | Recreation | Sports |
|---|---|---|---|---|
| | | | | |

8. Select something that is manufactured for your use and find how water is used in making this product. (Example: steel, paper.)
9. Visit a water treatment plant.
10. Compare biodegradable detergents to regular brands.
11. Show the difference in the water needs of a pioneer family and a family of today.
12. Make posters showing uses of water.

III. VALUES CLARIFICATION

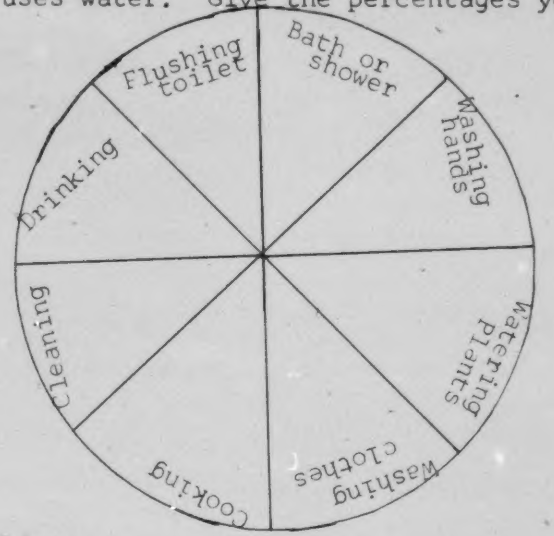
A. Complete these Statements:

1. I can save water when I brush my teeth by (not letting the water run constantly).
2. I can save water when I sprinkle the lawn by ( watering when the evaporation rate is low.)

3. I can save water when I get a drink by ( keeping cold water in the refrigerator and not letting it run until it gets cold.)
4. Some ways I can save water are ______________________________.
5. Complete the statement: Water doesn't grow in a faucet, it ______________________________.

B. Pie of Life:

My family uses water. Give the percentages you think you use.



C. Values Ranking:

Have students list the way man uses water. List these on the board. After the combined listing, let students rank the uses in order of necessity. You may have students vote on rankings. Some responses that may be received:

boating
bathing
cooling
drinking
swimming
cooking
putting out fires
heating
soft drinks

D. Let students interview at least two persons to find out how they conserve water and the amount they feel they need to do their work. These could include mother, father on the job, cafeteria worker. Record your information and share with the class.

IV. RESOURCES

Filmstrips:

"Land and Waters of Our Earth," CORF, color, 11 minutes.
"Environmental Education"( Natural Resources).
"Environmental Awareness," B-Steck Vaughn
"McDonald's -- Ecology Action Pack."
"People and Their Environment"-- Guide to Conservation Education.
"The Goodliest Land," Wachovia
"Water Conservation Today"-- A433-3, color

PROGRAM KITS:

"Look Around You --Environmental Awareness."
"The Total Environment", Scholastic.
"Fresh Water Ecology," color, McGraw Hill.
"Our Water and Air," Cornet Films.
"The Management of Water," McGraw Hill, color.

# AILING WATERS

## Grades 3–4

I. INTRODUCTION

While the useable supply of water has declined, man's needs for water have increased, doubling in the last twenty years, and now equalling one-third of the total stream flow.

Water is polluted when it contains something unwanted that does not naturally occur. Polluted water is not good for animals nor optimal plant growth. The natural ability of streams and rivers to absorb wastes through dilution and bacterial decomposition is being severly disturbed by man. Waste cannot be poured into our rivers and streams without prepercolation, and still obtain the quality of water necessary to sustain life.

Pollution of fresh water in Charlotte-Mecklenburg results largely from waste from industrial plants, liquids flowing from underground septic tanks that do not have sufficient drain fields, run-off from storm sewers, detergent waste, and agricultural run-off.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of a successful encounter, the student should be able to:

1. Understand nature's way of cleaning water by stone and sand percolation.
2. Understand why life may be killed in our streams and rivers.
3. How Charlotte-Mecklenburg takes care of its waste water problems.
4. What industrial waste goes into Charlotte-Mecklenburg waters.
5. List the sources of water pollution and make suggestions for controlling water pollution, i.e. by making industries install recirculation systems and precipitators.
6. Understand that polluted water affects animals and plants.

B. Activities:

1. Contact the Department of Public Works for Charlotte-Mecklenburg County - - request information on the way Charlotte-Mecklenburg plan to treat water pollution.
2. Visit a sewage treatment plant or a filter plant.
3. Tell how you and your family contribute to water pollution and ways you can cut down on water pollution.
4. Find out how pollution in the water is measured and how water is classified.
5. Read "The Story of Water," and dramatize it.
6. Present the play: Our Polluted War.
7. Find pictures showing ways water is used in Charlotte-Mecklenburg. Make a file. On the back of each picture include information telling how each is being polluted.
8. Collect some water from different places in your community. Test the water using the **Water Test Kit**.
9. Invite Mr. Vizzini to come and supervise the water testing.

C. Role Playing:

Pretend you and a friend are fish in Lake Norman. You are a grandfather trout. Your friend is the grandson trout who is visiting the grandfather. It's a busy weekend with lots of people visiting the lake. Grandfather is concerned about the pollution of their home. Carry on a conversation as you swin around the lake.

## III. VALUE CLARIFICATION

A. Value Voting:

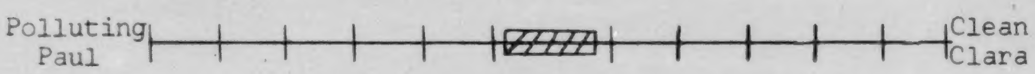
1. How many of you like to swim in a lake?
2. How many of you like to swim in a public pool?
3. How many of you like to swim so well that you would swim in any kind of water?
4. How many of you swallow water when you swim?

B. Rank Order:

Rank in the order that you would prefer to do during your leisure time.

1. Go fishing
2. Go swimming
3. Go boating
4. Go water skiing

C. How Would You Rate Yorself as a Polluter of Water Near You?



## IV. RESOURCES

Books:

Mecklenburg Metropolitan Sewarage Facilities, Henningson-Durham and Richardson, 1969. ( for teacher)

Environment, Resources, Pollution and Society, William M. Murdoch Sinaur and Associates. ( for teacher)

People and Their Environment: Teacher's Curriculum Guide to Conservation Education, Matthew J. Brennan, J. C. Ferguson Publishers, Chicago, Illinois.

Slides and Tapes:

"Water Pollution in Metrolina," Nature Museum

Records and Filmstrips:

"The Management of Water," McGraw-Hill.
"Fresh Water Ecology," McGraw-Hill.
"Let's Explore a Stream," Singer
"Pollution," Singer
"Water Pollution a Complex Problem," Singer.

Films:

"Uncle Smiley Goes Up the River," color, LPA.
"Water," CMC.
"Water," USO
"Water for all Living Things," EBEC.

Pamphlets:

"Our Polluted Water" ,Kids for Ecology ( May 1973).

The Story of Water Supply - - Charlotte Water Department, 600 E. Trade Street.

The Goodliest Land - - a report on our environment. Wachovia Corporation (Aug. - Oct. 1972).

Kits:

Ecology Kit - - Can I Drink the Water, Urban System
Water Test Kit - Hock Chemical Co.

Games:

Recycling Resources, Continental Can Co.
The Water Pollution, Continental Can Co.

# DIRTY WATER

## Grades 5–6

## I. INTRODUCTION

Water -- the universal solvent, the most abundant substance on the surface of the earth covering three-fourths of that surface, giver of life and cleanser of the biosphere -- is in trouble. The trouble-maker is man.

Human uses of water are endless. In addition to supporting life, water cleans, cools, produces power, supports transportation and can be the site for recreational activity. On the average, each urbanite, including Charlotteans, uses about 60-155 gallons of water per person per day. If total use, including production of food, clothing, paper, steel, etc.,is calculated, the average is in the neighborhood of 1500 gallons per person per day.

For millions of years waters have been receiving the wastes of natural systems -- animal wastes and plant wastes. And for millions of years natural processes have been decomposing and recycling the wastes. How?

When organic waste material is added to streams and lakes decomposing bacteria begin to break it down. These bacteria require oxygen -- oxygen dissolved in the water. Eventually, the decomposed wastes are little more than reusable elements and compounds -- carbon, hydrogen, phosphorus, and nitrogen.

If waters are self-cleansing, why then is modern man faced with polluted creeks, rivers, and lakes? The answer is clear. To many people living too close together dumping too many wastes into limited supplies of water. The natural decomposition system becomes overloaded. Tireless decomposing bacteria run out of oxygen before the excessive amounts of wastes have been broken down. Occasionally, decomposing bacteria are killed outright by toxic industrial wastes. When decomposing bacteria run short of dissolved oxygen or are killed, decomposition slows down. Anerobic bacteria, which do not require free oxygen, begin to work on undecomposed wastes. Foul odors result. Undecomposed wastes collect. Other plants and animals leave or die from a lack of oxygen. The bodies of these dead organisms must also be decomposed. The water becomes polluted.

Pollution can be classified according to its cause. Organic pollution was described above. Human wastes and farm wastes are not the sole sources. Food processing industries, pulp and paper mills and oil industries, to mention a few, generate huge amounts of organic wastes. Nutrients; i. e., phosphorus and nitrogen, which are among the end products of organic decomposition are also plant fertilizers. Streams and rivers which are recipients of excessive amounts of these nutrients often produce excessive amounts of algae. Blue-grass "algae blooms" float reducing the penetration of sunlight. Other plants and animals are affected by the decreasing amounts of dissolved oxygen and sunlight. Dieoffs and more pollution can result.

Thermal pollution is caused by increasing the temperature of natural water. When power plants and other industries use water for cooling, the water is returned to the river or lake warmed. This process can raise the temperature of the water by ten to twenty degrees in the immediate vicinity of the plant. Warmer water absorbs less oxygen so the decomposition of organic wastes mentioned above is slowed. Also, the increased temperatures increase the metabolic rate of many aquatic organisms, thereby increasing their demand for oxygen.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Describe the causes and effects of organic, industrial, sewage, and thermal pollution.
2. Describe the natural self-cleansing process of water ( biological decomposition or biodegradation in water).
3. Describe how waste overload disrupts this natural self-cleansing process including causes and effect of low dissolved oxygen.
4. Explain causes and effects of nutrients which overfertilize natural waters.
5. Develop and carry out a plan to improve water quality in the area.

B. Activities:

1. Secure a map of the area including creeks, ponds, rivers and lakes. Indicate (1) sources of area water. Where does tap water come from? (2) Where does waste water go? Drain water? Storm sewer water? List (3) uses of water while it is in the area ( drinking, industry, agriculture, recreational, cleaning, cooling, waste disposal, etc.). (4) How does area water become polluted? Discuss (5) the purpose of sanitary sewers. Storm sewers. Locate sewer lines near the school.
2. Visit, individually or as a class, nearby bodies of water. Note water quality (turbidity or mudiness, healthy vegetation, trash, level of flow, etc). Test for dissolved oxygen. Record temperatures. Is there evidence of nonbiodegradable substances in the water? Chart results. (6) Speculate on what waste water is dumped into the water. Pinpoint sources of pollution -- large storm drains, industrial sources, agricultural runoff, sewage treatment effluent, etc. Collect samples from several bodies of water for classroom study.
3. (7) Contact the County Board of Health or the Regional Office of the Air and Water Quality Control Commission. How are area bodies of water classified? (drinking, swimming, industrial, dumping, etc.). What are the water quality standards for the various types of use? How are water quality standards enforced? Who is in charge of enforcement?
4. In the classroom study how water naturally cleanses itself. Study collected samples. Allow small amounts of each sample to evaporate. What is left? Compare plant and animal life. Filter samples. Study the effects of nutrients; i.e., phosphorus on water quality (eutrophication). Study the effects of dissolved oxygen on acquatic life. Study the effects of thermal pollution. Gradually warm natural waters which contain plant and animal life. Fill three jars with distilled water. Put a tablespoon of detergent in jar A, a tablespoon of fertilizer in jar B and leave jar C as it is. In all three jars, pour 1 ounce of pond water. Let stand for two weeks. Compare jars. This experiment could be done again and again with different detergents and fertilizers. One way of removing phosphates from water is by adding calcium. Use the example above and add crushed chalk to jar B and leave the others as they are. What happens? Use two glasses and two pieces of celery. Put distilled water into one and salt water into the other. Let stand a day. Apply silver nitrate test. Does salt change into new substance? Salt, like DDT, is not biodegradable. Check the pH of the different waters with pH paper and a color matching pH chart. Take temperature of water in different ponds, streams, etc. Make a chart. Consider depth, flow rate, waste and organic meter present as well as shading.
5. (8) Study methods of reducing water pollution. Publicize our right to have clean water. Suggest how individuals can help.

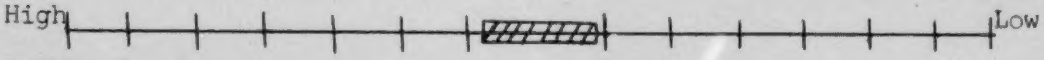
## III. VALUES CLARIFICATION

A. Strategies:

List ten uses of water. Circle the ones most important to you. Cross out the ones you could do without. What did you find out?

B. Continuum:

Where would you rate yourself as a polluter of our streams?



C. Rank Order:

1. Which would you rather do on a beautiful Saturday afternoon?
    a. Go fishing
    b. Go swimming
    c. Play with water sprinkler.
2. I am proud that: ______________________________________________
3. Choose your own way to show how you know that water pollution affects the lives of the people of Charlotte and their life habits.

## IV. RESOURCES

Films:

"Clean Water is Everybody's Business", NMA, 35 mm, color
"Clean Water", NMA, 16 mm, 20 minutes, color.
"Crisis on our River", HES, 16 mm, 14 minutes, color
"The Gifts", MOD Loan, no charge, 16 mm, 28 minutes, color
"Potomac Concept", NPS, 16 mm, 29 minutes, color
"Problem With Water is People", MHT, 16 mm, 30 minutes, color
"Pure Water and Public Health", MOD, 16 mm, 28 minutes, color
"Water, MFB, 16 mm, 15 minutes, color
"Your Friend the Water ( Clean or Dirty)", ERB, 16 mm, 6 minutes, color
"The New River", API, 16 mm, 23 minutes, color
"How Water Helps Us", CFC, 16 mm, color
"It's Your Decision - Clean Water", AFI, 16 mm, 14 minutes, color
"We Explore the Stream", CFC, 16 mm, color
"The Year of Disaster", MOD, 16 mm, 25 minutes, color

Filmstrips and Records:

"Waste- A New Pollutant", Society for Visual Education
"Water Pollution - A Complex Problem", Society for Visual Education

Books and Pamphlets:

Water Pollution, Charles W. Lavaroni, Patrick A. O'Donnell, Lawrence A. Lindberg, Addison-Wesley Publishing Company, 1971
People and Their Environment: Teacher's Curriculum Guide to Conservation Education, Editor Matthew J. Brennan, J. G. Ferguson Publishing Co.,1972.
A Primer on Waste Water Treatment, Environmental Protection Agency, Water Quality Office, U.S.Government Printing Office, 1971.

# WASTEWATER TREATMENT

Grades 5-6

## I. INTRODUCTION

Millions of gallons, 35 to 40 million gallons, of water enter and leave Mecklenburg County daily. It adds up to more than 155 gallons per person per day. Most is treated before it is used and again after it is used.

As in any urban setting, the cleansing and disposing of wastewater is no small problem. Septic tanks for isolated home owners and sewage treatment plants which serve clusters of country residents and urbanites are in many cases ineffective or overloaded.

Septic tanks are simple but they have many disadvantages. Underground septic tanks generally hold up to 11,000 gallons of water. They contain bacteria which biologically break down the organic wastes into dissolved nutrients- a very natural process which occurs everywhere in nature -- biodegradation. Liquid containing the decomposed materials overflows into a drain field which has small openings which allow the water to be absorbed into the soil. The dissolved materials are rich nutrient additions to the soil.

The disadvantages of septic tanks are obvious. During periods of heavy rain, the soil cannot absorb the tank overflow. Undecomposed wastes may be flushed into nearby waterways or pools above the ground. There is a danger of disease. Some areas are not suitable for septic tanks. When the lake is high, septic tanks can flood and untreated wastes and excessive nutrients may enter the lake.

Charlotte operates three sewage treatment plants, the country operates four others and county towns operate their own. Primary and secondary treatment of wastewater is employed.

Primary treatment is a sedimentation process. When wastewater arrives at the sewage treatment plant, it is screened and large solids such as sticks, rags, etc., are shredded and removed. Next it enters large settling or clarification tanks where the rate of flow is greatly reduced. Suspended solids settle where they are collected and oil, grease and floating materials are simmed from the surface. This, the sedimentation and skimmings, is called sludge. This rich organic sludge is sent to the digestor where anerobic bacteria ( bacteria which do not require free oxygen to decompose wastes) further decompose it for several days. Primary sewage treatment, then, is primarily a mechanical process where secondary sewage treatment is essentially biological.

In many areas wastewater treatment ends with primary treatment and only about 50 per cent of the pollutants are removed from the water before it is returned to a stream or lake.. Secondary treatment will remove up to 90 per cent of the organic materials and the suspended solids.

The trickling filter process is one method of secondary treatment of wastewater. The effluent from primary treatment is allowed to trickle through a deep bed of stones which are covered with a biologically active which is rich in decomposing bacteria. As in nature, bacteria will decompose organic wastes. As the floc builds up it sloughs off and moves from the bottom of the tank with the water to a settling basin. The sludge which settles is sent to the digester for further decomposition.

Another way to take advantage of biological decomposition is to add bacteria and oxygen to wastewater for several hours. This is called the activated sludge process because active bacteria in the sludge are added to the aeration tanks where air is bubbled through to aid the decomposing bacteria. Chlorine is added to the final effluent to kill bacteria.

Both processes are subject to biological dieoff when excessive amounts of toxic materials enter the system. This renders the treatment ineffective for seven to ten days until the bacteria re-establish themselves.

After treatment the quality of wastewater can be measured in several ways. BOD, Biochemical Oxygen Demand, is one way. It is the rate at which organic wastes need dissolved oxygen in the water for decomposition. As the chart shows, further treatment or tertiary treatment must be added if water which Charlotte dumps into Sugar Creek and McAlpine Creek are going to be as clean as the water which Charlotte takes from Lake Norman.

| | BOD Reduction | Suspended Solids Reduction | Phosphate Removal | Cost/1000 Gallons |
|---|---|---|---|---|
| Primary Treatment | 35% | 45% | 20% | $0.10 |
| Secondary Treatment | 90% | 90% | 30% | 0.20 |
| Tertiary Treatment | 99% | 99% | 99% | 0.40 |

If our country's goals for clean water everywhere are to be met cities like Charlotte will have to do a better job of treating wastewater. The Federal Water Pollution Control Act Amendment, passed on October 18, 1972, states that by July 1, 1983, all U.S. waters will be clean enough for recreational use and that by 1985, there will be no discharge of pollutants into our waters.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Explain, using a map, where Charlotte gets its water and where treated wastewater leaves the city.
2. Explain how a septic tank removes wastes from water, including disadvantages associated with the use of septic tanks.
3. Discuss how wastewater is treated at a sewage treatment plant.
4. Discuss disadvantages of present wastewater treatment.

B. Activities:

1. Contact the Department of Public Works for the City of Charlotte or Mecklenburg County. Request information on water use in the area. Where does the city get its water? How and where is it treated before it enters our homes? Where does wastewater go after it leaves our homes? Where is it treated? How much is treated daily? On a map of the area trace the path of water in and out of Charlotte.
2. Visit a sewage treatment plant. How much water is treated daily? What is the cost? Follow the water through the plant noting what is done at each step. How long does the whole process take? Where is the natural process of biological decomposition taking place? Where does the treated water go? What is the condition of that stream? How often is this effluent tested? What is the quality of the effluent? What percentage of the organic wastes are removed? Suspended solids? What is the BOD count before and after treatment? Are there problems following heavy rains? Are there restrictions on what industries can send to the plant? How are new sewage treatment plants financed?
3. Contact the County Health Department. Ask the following questions. What additional treatment will be necessary to meet the 1983 and 1985 water quality standards? What problems are caused by pollutants which are not now removed by sewage treatment plants? Which industries have their own sewage treatment plants?
4. In the classroom list ways individuals can cut down on wastes added to water. Don't use garbage disposals, use low phosphate detergents,

etc. Publicize facts about wastewater to others in the school and parents. Write to the Regional Office of the Air and Water Quality Control Commission in Concord regarding your concern with wastewater disposal in Charlotte-Mecklenburg.

## III. VALUES CLARIFICATION

A. Values Voting:

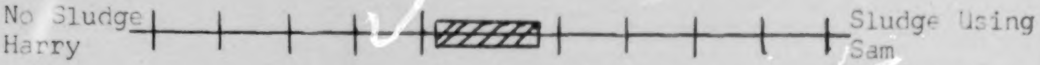
1. How many of you use a septic tank, municipal sewage, wastewater treatment facilities?
2. Would you eat a tomato that was grown with sludge as a fertilizer?
3. How many would be willing to drink treated sewage water?
4. How many would be willing to drink water in space ships after they had been out for several weeks?

B. Rank Order:

Which do you consider most effective: septic tank, municipal sewage or wastewater treatment?

C. Continuum:

If you could use sludge where would you place yourself?



## IV. RESOURCES

Books and Pamphlets:

Mecklenburg Metropolitan Sewage Facilities, Hennigson, Durham and Richardson, 1969.

A Primer on Wastewater Treatment, Ruckelshaus, William D., 1971.

Field Guide to Environmental Education, Charlotte-Mecklenburg Schools, 1972.

Environmental Education Program, Stapp, William B., 1971. (unpublished, K - 12)

Films:

"Publis Health Program in Mass Evacuation", NMA, 16 mm, 13 minutes, Black and White.

"The Pursuit of Cleanliness", AFI, 16 mm, 14 minutes, color.

"The Treatment was Successful, but the Patient Died", NAC, 16 mm, 30 minutes, Color.

"Activated Sludge Plant with Vacuum Filtration and Incineration", PHS, 35 mm, 8 minutes, Black and White.

"Bio Pac", LBC, 16 mm, 13 minutes, Color.

"Clean Waters", CIL, 16 mm, 24 minutes, Color.

"Constructing a Typical Household System", PHS, 16 mm, 14 minutes, Black and White.

"Municipal Sewage Treatment Process", PHS, 16 mm, 13 minutes, Black and White.

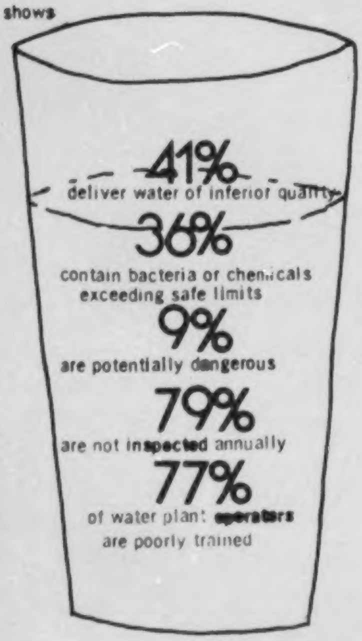
"Sewers: A Hidden Community Benefit", PAC, 16 mm, 30 minutes, Color.

"Tale of the Twin Cities", MSP, Loan, 16 mm, 30 minutes, Color.

"Living with Today's Waters", Mod. 16 mm, 26 minutes, Color.

## Is your drinking water safe?

A survey of 969 public water systems shows



41% deliver water of inferior quality

36% contain bacteria or chemicals exceeding safe limits

9% are potentially dangerous

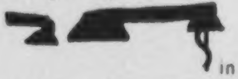
79% are not inspected annually

77% of water plant operators are poorly trained

Poorly treated water spreads disease and runs up an incalculable health bill

## Price tag on clean water

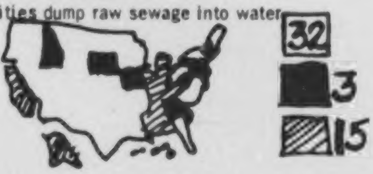
It will take a 5– year investment of $42 billion to clean up water. Over half is industry's responsibility.



| | in billions |
|---|---|
| 1. Municipal waste treatment plant construction costs: | $8.7 |
| a. Primary and secondary treatment | $3.9 |
| b. Tertiary treatment | |
| c. Operation and maintenance | $4.5 |
| 2. Industrial abatement costs: | $3.2 |
| a. Nonthermal | |
| b. Reduce thermal pollution | $2.0 |
| c. Operation and maintenance | $4.0 |
| 3. Interceptor and storm sewer improvement costs | $7.4 |
| 4. Sediment control and acid mine drainage reduction costs. | $6.6 |
| 5. Reduction costs for oil spills water craft discharge and miscellaneous | $1.0 |
| 6. Added reservoir stroage for low flow augmentation | $1.0 |
| Grand total | $42.3 Billion |

## What's being done about it?

Only 32 states have fully approved water quality standards. More than 1 000 communities dump raw sewage into water



Scoreboard as of July 15. 1971, 32 states have approved water quality standards, including antidegradation. Gain over 1970 EQ Index of six.

3 states have approved water quality standards but without antidegradation. 15 states have partially approved water quality standards, only 7 including antidegradation. Gain of 16 states with antidegradation clauses over last year.

## Will water be rationed?

North Americans are removing fresh water from underground sources twice as fast as the hydrological cycle can replace it. Europeans three times as fast. At present rate, Americans will need 700 billion gallons of underground water per year in 1980; only 650 billion willbe available

# AUTO-GO

## Grades K-3

## I. INTRODUCTION

A car is used several years by the American consumer and then discarded. Most Americans tend to buy a new car than repair the old one, thusly, our earth is being covered with mountains of junked autos.

The problem of abandoned autos was recognized in the 1960's. A slack market for scrap steel and the rising labor cost of separating ferrous from nonferrous metals, has caused a pile-up junked autos which can no longer be ignored. The problem is becoming a public eyesore. Junked cars are to be found, not just in junkyards, but along public roads, parks, yards, in parking lots, and farmyards. Until recently, junked automobiles were incinerated in "open burners," however, because of the stree on air pollution, we must find other ways.

Machines have been developed to help cope with the problem. One such recycling machine can chew 1,400 cars a day, sort out the metals and bale the remains. Recycling of automobiles is new to North Carolina but some progress is being made. We have auto shredders being used in Kernersville and Raleigh which are recovering usuable metals. Studies are underway to locate similar facilities in other parts of the state.

There are many problems to contend with which seems to be slowing the efforts toward recycling of automobiles across the nation. Transportation seems to be the major concern. The problems with the railroad are 1) getting the obsolete metal to a processing plant, and 2) moving the processed product to the consumer. The railroads would rather ship new cars than recycled ones, which brings us to another problem -- the attitude of the consumer.

The average American's thinking about the automobile needs to be re-evaluated. For instance, do so many American families have to own two or three automobiles? Does the body style of a car have to change every year? Does owning a new car give you social prestige? Could cars be made to be repaired instead of discarded? This problem will not be solved until it is demanded by the public.

But keep in mind that there are now over 100 million autos in the United States -- with 300 million estimated by 1980. Solid wastes collected annually includes 7 million discarded automobiles. A high grade of iron and steel can be produced from junked cars. Did you know that one automobile consists of the following?

2,532 lbs. of steel
511 lbs. of cast iron
32 lbs. of copper
54 lbs. of zinc
51 lbs. of aluminum
20 lbs. of lead
145 lbs. of rubber
87 lbs. of glass
142 lbs. of assorted materials.

It has been shown that it would cost about $ 51.00 to produce about $ 56.00 worth of marketable ferrous and nonferrous metal products -- an annual return of 10% on the investment.

It is sad that solid metallic waste, a true national resource, is a problem because it is not being recycled for our use.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of a successful encounter, the child should be able to:

1. Recognize that junked automobiles are becoming a problem.
2. Know the ways to help solve the problem of junked autos.
3. Know where automobiles can be recycled in North Carolina.
4. Be aware that recycling of automobiles has been slow.
5. To be able to list several valuable materials which are being wasted by not recycling the automobile.

B. Activities:

1. Observe places, or take a field trip to where automobiles have been abandoned. Discuss it from an aesthetic viewpoint. Does it spoil the beauty of the environment? Should junked autos be placed along the roads to be viewed when we are traveling? Pictures may want to be taken and kept in a big scrapbook to compare junked areas with other "unspoiled" areas.
2. Find out how automobiles are being discarded in Charlotte-Mecklenburg. Find out if there is a plan to recycle cars here in the future. Survey the community to find out their views. Would they like to have a recycling center here or nearby?
3. Write to the recycling centers in Kernersville and Raleigh to find out more about the recycling process. How does it work? How much does it cost? What materials are reusable? What are the problems Maybe a speaker could be invited to visit the class or a field tri planned to visit one of the centers.
4. Contact local car dealers. What kind of attitude does the America consumer have toward the automobile? How many new cars are sold each year?
5. Art: Draw or compare changes in automobile body styles from year to year.
6. Research on the different materials which are used in making a car are we running out of any of these materials? Can they be used again to build new cars after recycling? Are there any new materi which could be used in making cars that would help to eliminate th auto junkyards.

## III. VALUES CLARIFICATION

A. Values Voting:

1. Do you like to see junked cars along the highway?
2. Would you leave a junked car parked in your yard?
3. Would you tell your neighbor that you disapprove of the junked aut in his yard?
4. If your car broke down, would you go out and buy a new one?
5. If you could afford a new car every year, would you trade?

B. I Learned Statements:

1. I realized that ______________________________.
2. I didn't know that __________________________________.
3. I was surprised that ____________________________.
4. The most ineresting thing was that __________________.
5. I was not pleased to learn that _________________________.

C. Creative Writing Story:

You live in an apartment complex. Someone has left a wrecked car in your parking lot. It has been there for two months. What could you do about it? How do you feel about it and why?

D. Rank Order:

1. Which do you consider the least pleasing sight when you are traveli
   a) bill boards

  - b) junked cars
  - c) weeds
2. What style car would you buy?
  - a) small economy
  - b) medium-size
  - c) large
3. Would you rather --
  - a) own your own car
  - b) drive your father's car
  - c) share one with a brother or sister
4. In order to lessen the amount of cars, would you?
  - a) ride the bus
  - b) walk
  - c) car pool

## IV. RESOURCES

Books:

Earth Tool Kit, Sam Love, Pocket Books, 1971, p. 114, p.183.

Dismantling a Typical Junk Automobile to Produce Quality Scrap, K.C.Dean and J.W.Sterner, Report of Investigations 7350, Bureau of Mines, U.S.Department of Interior,1969.

Environment and Man, Richard H. Wagner, W.W.Norton and Company,Inc.1971.

Pamphlets:

Waste Age, "Role of Transportation in Disposal of Obsolete Metallic Waste," H. Cutler, July-August, 1970.

All Clear, " Re-Incarnated Metal," S. Francis, September, 1970.

Wachovia, " The Goodliest Land, " The Wachovia Corporation, August-October, 1972.

Filmstrips:

"Pollution -- Land Pollution," Ward's,color.

"Solid Waste-- A New Pollutant," Society for Visual Education, color.

Kits:

(Available from the Charlotte Nature Museum)

"Recycling Resources," Continental Can Company, Inc., Richard Hatch, 1971.

"Our Environment Problem or Promise? " A. J. Nystrom and Co., 1972.

# JUST A LITTLE BIT OF HELP, PLEASE

Grades 3–4

## I. INTRODUCTION

Students need to become aware of and concerned with local problems, especially that of solid waste. All litter is unsightly, and some have more lasting, unpleasant effects than others. Articles of organic origin ( food, paper, etc.), will eventually decompose to form soil. "Tin" cans ( which are really tin-coated steel) will eventually rust and disintegrate. The most lasting scars on the landscape are items made from aluminum, plastics, and glass, which remain intact for indefinite periods of time.

Human carelessness and disinterest has much to do with the problem. Other factors influencing the amount of solid waste are enlarging populations, a high-consumption economy; indiscriminate use of packaged and canned foods; planned, early, obsolecence of automobiles and household appliances; economic demands on industry and agriculture; increased use of plastics and paper products containing impregnated chemicals. Americans are discarding solid wastes at the rate of 360 million tons annually.

Some other problems that have resulted are: endangerment to wildlife, such as from the chemicals, pollution of much-needed water-ways from dumps and misuse of scenic areas.

More strain is being placed on the already overtaxed environment. There is an increase of ugly dumping areas: no place to properly dispose of the undisposable. A complete solid waste handling system, storage, collection, disposal, is a basic need in every community. What is your community doing about solid waste?

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

After studying each encounter, pupils should be able to

1. Locate nearby areas which are litter areas and cause problems.
2. Know to eliminate litter.
3. Help others not to litter.
4. Know the problems caused by littering.
5. Put all litter in its proper place.

### B. Activities:

1. Take a walk over the school grounds. Find two or three places which are litter problems. Decide what can be done about it.
2. Draw a map pinpointing the problem areas of the walk taken.
3. Take pictures before beginning improvement. Take pictures after completion.
4. Seek help of the community, if possible. (Have someone visit and talk to the class. Visit a sanitary landfill.)
5. Use the map drawn ( of the walk in Activity No. 1) at a PTA meeting to encourage cooperation of adults in combating the problem.
6. Plan the kind of city you would like to live in. ( Cut out and paste houses, buildings, etc.)
7. Compare it with the real city in which you live.
8. Prepare a bulletin board.
9. Use a philodendron plant in the classroom. Dust it once a week. How much dust do you find each time?

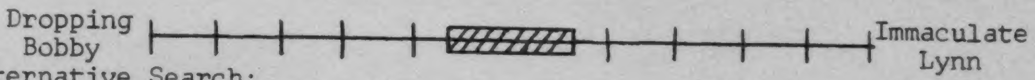
## III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you have passed a piece of paper on the floor today and did not pick it up?
2. How many of you have dropped paper from candy or gum or a popsickle stick on the ground this week?
3. How many have picked up trash around the trash containers in the cafeterias at lunch-time this week?
4. How many of you have kept your room at home clean this week?

B. Continuum:

1. Are you Dropping Bobby or Immaculate Lynn?
2. How well do you do in keeping our school litter free?



C. Alternative Search:

| Issue | I'll Try | I'll Consider It | I Won't |
|---|---|---|---|
| 1. Pick up trash when I see it. | | | |
| 2. Keep the yard clean at home. | | | |
| 3. Remind others not to litter. | | | |

D. Unfinished Sentences:

1. I am proud that I ____________________.
2. I realize that I ____________________.
3. I have learned that ____________________.

## IV. RESOURCES

Films:

(From National Medical Audiovisual Center, Station K, Atlanta, Ga.303224

1. "What's New in Solid Waste Management," color, 37 min., 1970, No.M2049-X.
2. "The Stuff we Throw Away," color, 22 min, 1970, No. 2048-X.
3. "A Day at the Dump," color, 15 min., 1968.
4. "Waste Away," color, 22 min., 1969, No. M2047-X.
5. "Sanitary Landfill· One Part Earth to Four Parts Refuse," color, 24 min., 1969, N. M. 1740-X.

Clarifying Values Through Subject Matter, Winston Press, Inc. Minneapolis.

A Place to Live, The National Audubon Society.

Social Studies and Science Activities, Frank J. Sciara and Richard B. Walter, Instructor Curriculum Materials, # 316.

Wachovia - - The Wachovia Corp., 1972.

Progress Toward Pollution, free, Cars Public Relation Staff, General Motors Corp., Detroit, Michigan, 48202.

People and Their Environment, Teachers' Curriculum Guide to Conservation Education, Grades, J. G. Ferbuson Publishing Co., Chicago, Ill., 4, 5, and 6.

# BICYCLE AS IF YOUR LIFE DEPENDED ON IT

Grades 3–4

## I. INTRODUCTION

Forty years ago, 90 per cent of the U.S. public either walked, bicycled, or used public transit to get to work, schools, or shopping. At the turn of the century, the bicycle began to lose popularity to the newly created automobile. Thus, the bicycle lost its prominence and became a "child's toy" to most Americans.

In the late 60's, the American public began to rediscover the bicycle as a means of transportation and recreation. In light of the automobile's role in fuel shortages, air pollution, traffic congestion, and a less healthful society, it is apparent that some alternative transportation methods are needed.

One possible alternative is increased use of the bicycle not only as a recreational vehicle, but as a commuting vehicle as well. The bicycle offers: no pollution, low upkeep, no noise, small space use, non-congestion, healthful exercise and fun. In 1972 more bicycles were sold than new automobiles -- over 10½ million.

Although the bicycle is making a comeback, in most areas it does not have the protection from its worst enemy -- the automobile. Safe, marked paths, lanes or trails are desperately needed.

In Davis, California, bicycle lanes and paths were installed in 1967, and to date there have been no bike-auto accidents where the lanes are. The system is so good, 40 per cent of the commuting traffic is by bicycles. Many cities are taking steps to provide adequate scenic and recreational trails and commuting bike lanes. It is essential that cities begin to identify, acquire, and construct areas suitable for commuting and recreational biking.

In 1972 report of the North Carolina Department of Natural and Economic Resources on Resources for Trails in North Carolina, indicate that the Charlotte Mecklenburg area should have a minimum of 175 miles of bikeways, trails, paths, or lanes. In our city where the automobile is the dominant mode of transportation, alternate means of transportation must be urged and supported in order to ease the foreseeable traffic and pollution problems.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

1. Discuss problems associated with present methods of transportation.
2. Discuss advantages and disadvantages of the use of the bicycle as a means of transportation.
3. Know and obey traffic regulations and safety rules.
4. Suggest how bicycling might become a safer and more acceptable means of transportation in Charlotte.

B. Activities:

1. Take a walk around the neighborhood to observe present modes of transportation.
2. Survey area residents.
   How many bicycles in each family? Types of bicycles? Age of cyclists? Most frequent bicycle trips (store, school, work, church, etc)? By what means do residents make the following trips: Recreation? Work? School? Have residents ever taken a bike ride of five miles or more?
3. Make a map of the area.
   Indicate location of bicycle owners. Plot present bicycle routes. Indicate where safe bike routes could be built.

4. Contact sources of information on bicycles: e.g.,Tarheel Cyclists, Charlotte Traffic Engineers, and/or the Charlotte Police Department. Request information on bike trails, bike ways, and bike paths. Publicize the plan at the school and in the agencies.
5. Administer the Bicycle Safety Knowledge Test. Continually emphasize the importance of bicycle safety, bicycle registration and maintenance.

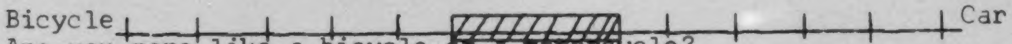
## III. VALUES CLARIFICATION STRATEGIES

A. Values Voting:

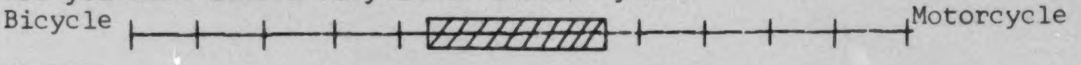
1. How many of you would prefer to ride a ten-speed bike to compared to a mini-bike?
2. How many of you would prefer to ride your bike, rather than ride to the shopping center in a car?
3. How many of you would ride miles to Carowinds on your bike if there were a safe bike route marked out?
4. How many of you prefer to ride your bikes on paths and sidewalks instead of streets?
5. How many of you bicycle riders give arm signals before making turns or coming to a stop?
6. How many of you bicycle riders select routes with the fewest automobiles and slow speed traffic?

B. Continuum:

1. Where would you place yourself on these lines; if you were traveling less than one mile; between one and three miles?



2. Are you more like a bicycle or a motorcycle?



## IV. RESOURCES

Consumer Resources Idea Manual developed by the Consumer Resources Environteam.

Bicycles, Charles Coombs, Morrow Publishing Company, 1972.

I'm No Fool With a Bicycle,(filmstrip),Ency.Brit.,1958,color,Walt Disney

Bicycles: All About Bikes and Bicycling Care, Repair and Safety, Max Alth, Hawthorne Publishing Company,1972.

Bicycle Safety Knowledge Test, Charlotte-Mecklenburg Schools, Environmental Education Center.

# A CITY DESERT OR OASIS

Grades 5–6

## I. INTRODUCTION

Two thousand years ago Apollodorus designed for the Roman Forum a shopping center of two levels which was enclosed and ventilated as well as lined with open front shops. In European medieval times little shops sprang up around cathedrals. By the nineteenth century, arcade architecture could be found in Milan, Italy and London, England which were covered, lined streets of shops. In the United States, the middle class migration to the suburbs after World War II and the interstate highways, looping around the cities, gave impetus to shopping centers from the strip form to the more elaborate sprawling malls.

Today four of 10 Americans are suburbanites, or some 80 million people altogether have "downtown" on their cities' fringe. In fact that the city of today in form has not a single nucleus but also several satellite centers in which the suburban shoppers buy 7 per cent more than buyers in the central business district. In 1963, 68 million dollars of retail business was transacted in these centers which grew to some 123 million dollars by 1972. Land in 1950 in Seattle, Washington, one of the earliest malls, was 5 cents a square foot, but in recent years the square foot brought $ 6.50.

Handling some 44 per cent of retail sales, these shopping centers not only increased land values but also the varieties of services offered. A survey revealed 46 per cent of shoppers desired libraries and 22 per cent requested teen centers. The mall meant more than shopping in daily America. Competition between centers and downtown business brought bizarre consequences-everything from cemetaries to investigations by the Federal Trade Commission. Even a Supreme Court decision in 1968 in free speech centered on shopping centers. Inherent were other effects as crime increases in auto theft, shoplifting, and bank robberies; necessity for acres of free parking; and the inevitable decay of the central city with resulting social problems.

Environmentalists have just caught their breath to consider the assault on nature. What happens when 50 per cent or more of the surface of a given land area is waterproofed by asphalt? Where must all the rain and melting snow go? What happens to temperature when no soil exists for plants? What sounds fill the air besides birds chirping and rustling leaves? Are those odors from blossoms and green leaves? Where is all the metal to make suburban cars? Is there fuel enough for so many vehicles? How can goods be manufactured, wrapped, distributed, and sold in so many places? Where does one put all those cellophane wrappings, bags, strings, and trash?

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the completion of a successful encounter, the student should be able to:

1. Understand that environmental design is necessary for a balance of nature and land use.
2. Explain the good and bad environmental features regarding shopping centers, and the like.
3. Name three land use factors that affect air quality and water quality.
4. Site examples of poor and satisfactory land management.
5. Design a small community that meets environmental quality standards for land management.

B. Activities:

60

1. Interview someone familiar with the use of the land before the shopping center was developed. What was the land used for? What vegetation was removed to build the shopping center? What changes followed the development of the shopping center? Street widenings? Other building centers? Could people walk to shop? Were there small neighborhood groceries in the neighborhood?
2. Survey shoppers at a shopping center. How many walk to the shopping center? How many drove alone? Do they have a grocery store within walking distance of their home? What do they like about the shopping center? Dislike? Examples: trees, convenience, smells, noise, parking, the goods available, driving to shop, walking to shop, beauty, neighbors they meet, time they save, birds, etc.
3. Secure or draw a map of the shopping center showing streets, types of business, parking lots, areas of garbage disposal, traffic patterns, etc. What percentage of the land has vegetation? What percentage of the land is waterproofed? Compare the use of the land before the center was developed, such as drainage patterns.
4. Conduct an environmental inventory of the area. Compare microclimate of the shopping center with other areas, including areas which resemble the former land use of the area. Measure temperatures.

   *Measure air pollution and winds. Where does rain water go? (Into the storm drains and eventually to a creek.) What washes into the creek with the runoff? (Pollutants such as gasoline, oil, rubber bits, etc.) Investigate problems caused by the automobile. (Traffic congestion, air pollution, water pollution.)
5. Obtain a map of Charlotte. Indicate the shopping centers. Investigate the process of city planning as related to shopping centers. Contact the Charlotte-Mecklenburg planning commission. Why are shopping centers placed where they are? Are there regulations controlling design? Aesthetics? Density of buildings? Amount of land which can be waterproofed? Size and type of signs? Landscaping? Find out about zoning regulations. How is the area around your school zoned? Indicate zoning on a map. Could a small grocery store be built in your neighborhood for those who can't or won't drive to shopping centers?

## III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you would buy a house on a busy street across from a shopping center?
2. How many of you like to visit a shopping center?
3. How many would like a shopping center near your house?
4. How many would like to live in an apartment behind a shopping center?
5. How many would like to own or build a store in a shopping center?
6. How many of you would like to cross a busy intersection at late afternoon?
7. How many would like to ride a bike to the center to buy some bread?

B. Continuum:

1. If you could go to a shopping center anytime you choose, where would you place yourself?

Daily Dick |—|—|—|—|▨|—|—|—|—| Rarely Rick

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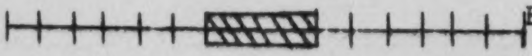
* Refer to Part E of III

2. If you were on the Charlotte Planning Commission and you were asked to vote on a large shopping center where would you place yourself?

Consenting Connie  Banning Bonnie

C. Rank Order:

1. If you could choose a store to put in the shopping center, which would you pick?
   a. Service station
   b. Supermarket
   c. Drive-in cleaners
2. If you could get a well paying part-time job cleaning up around a place, what place would you choose?
   a. U.S.Post Office
   b. Harris-Teeter's ( grocery)
   c. Hardee's
3. If you were given a large amount of money, where would you put it?
   a. Large downtown bank
   b. Secret hiding place
   c. Branch bank at shopping center
4. If you owned a large wooded area fronting the shopping center, what would you accept for it?
   a. Large amount from company developing center
   b. Medium amount for part of land for apartment developers
   c. Amount offered from park and recreation developers
5. If you had to wait on a ride for about an hour, what place would you choose to meet?
   a. Sharon Amity and Randolph intersection
   b. Beside the A&P Store
   c. Behind Collins Department Store

D. Game:

1. Man in His Environment, Coca-Cola Bottling Company ( available at Environmental Education Center, Charlotte Nature Museum).

E. Kit:

1. Johnny Horizon Kit ( available at Environmental Education Center, Charlotte Nature Museum).

IV. RESOURCES

Books

Environment and Man, Richard H. Wagner, W.W.Norton & Co.,Inc.,1971.

Living with Your Land: A Guide to Conservation for the City's Fringe, John Vasburgh, Scribner, 1968.

The Deligent Destroyers, George Laycock, Ballantine Books, 1971.

Superhighway - Superhoax, Helen Leavitt, Ballantine Books, 1971.

Periodicals:

Breckinfelt, Gurney, "Downtown Has Fled to the Suburbs", Fortune 86:80-87, 156-162, October, 1972.

DeWolf, Rose, "Shopping Centers: Main Street Goes Private", Nation 215: 32-35, December 18, 1972.

"How Shopping Malls are Changing Life in U.S.", U.S.News and World Report 74: 43-46, June 18, 1973.

Films:

"Clean Town, USA", Charlotte-Mecklenburg Schools, Hearst Metrotone News, 1971, color, 15 minutes.

"Boomsville", Charlotte-Mecklenburg Schools, National Film Board of Canada, 1969, color, 11 minutes.

"A Nation of Spoilers", Charlotte-Mecklenburg Schools, Alfred Higgins Production, 1964, color, 11 minutes.

"Pandora's Open Top Box", Charlotte-Mecklenburg Schools, U.S. Public Health Service, color, 16 minutes.

"Bulldozed American", Carousel Films Inc., New York, N.Y.

"Yours Is The Land", Encyclopedia Britannica Educational Corp, Chicago, Illinois.

# URBAN SPRAWL: EFFECT ON VEGATION

Grades 5–6

## I. INTRODUCTION

Nature is altered most severly in the hearts of our cities. The ground is covered by buildings and pavement, water flows only from faucets and gutters, the sky is gray with pollutants, and plants, if any, are few. Plants in the city are no longer a necessity since food is imported from elsewhere. Urban vegetation has become an artifact of culture reflecting man's desire rather than his needs. But the real value of urban vegetation is not fully understood. What is the worth of a forest in the city? Of an urban vegetable garden? Of a tree house in a vacant lot?

Physically, plants enhance the city's physical environment in several ways. Vegetation helps cool urban areas. Comparing two plots of land, one a rural field covered with grass and one an urban area covered by acres of concrete, one finds that vegetation greatly affects ground temperatures. The air is cooler both during the day and at night. During the day less heat is absorbed by the vegetated area and during the night the insulating vegetative blanket prevents considerable heat flow from the soil below. Research in New York City has shown that even small green acreas have an unexpectedly large beneficial effect on the urban microclimate.

Vegetation also removes both gaseous and particulate pollutants from the atmosphere. Studies in Hyde Park in London reveal that the park's one square mile area reduces smoke concentration by an average of 27 per cent. Coniferous trees are more effective than deciduous trees in filtering particulates, but they are more easily damaged by gaseous pollutants.

Vegetation is important in buffering noise and in providing habitat for wildlife in the city. Vegetation in and around cities can be classified into four categories: (1) trees growing between man's constructions ( buildings, streets, etc.) called interstitial forest, (2) parks and green zones existing in blocks or sizeable patches that are relatively unbroken by human constructions, (3) gardens for ornamental plants and sometimes food, and (4) lawns or interstitial grassland.

Interstitial forest characterizes older single-family residential areas. Mass development techniques used in the construction of suburbs since World War II leave suburbs unshaded.

Lawns have become a curious symbol of suburban living. Much energy and water and many minerals are misspent on growing green lawns. Americans spend about $3,000,000,000 annually on the care of lawns. Much of the expensive inorganic fertilizer washes quickly into drains and empties into streams and lakes, often fertilizing the water and stimulating unwarranted algae growth. Extensive useless suburban lawns increase urban sprawl. Well planned parks, similar to those found in Europe might better serve the needs of future neighborhoods.

Man evolved as a creature of the forest and its edges. Perhaps we need to explore more fully the reasons for nature in the city. Are plants in the city a necessity?

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Discuss the purpose of vegetation, environmentally, in the city.
2. Describe the categories of urban vegetation ( interstitial forests, parks and green spaces, gardens, and lawns).

3. Discuss the effects of replacing vegetation with buildings and pavement.
4. Draw plans for a residential area, a commercial area, an industrial area and a recreational area which make good use of natural vegetation.
5. Discuss the impact of mass development methods of construction suburbs and shopping centers (the removal of all vegetation before construction begins).
6. Make recommendations to the city planners regarding construction and vegetation policies.

B. Activities:

1. Obtain a map of the area surrounding the school and a map of downtown Charlotte. Indicate areas covered by vegetation. Classify vegetated areas according to use ( parks, gardens, etc.).
2. Take a walk around the neighborhood. Visit an area largely covered by vegetation. Observe the vegetation. What problems do you see? Record temperatures four feet above a grassy area and four feet above the pavement. How does vegetation affect water runoff? Measure noise twenty feet from a street which is buffered by vegetation and twenty feet from a street with a comparable amount of traffic which is not buffered. How do trees affect the need for air conditioning which requires great amounts of energy?
3. Contact the Air Pollution Commission in Concord. Request information on the ability of plants to filter pollutants, both particulate and gaseous. Request information on the effects of automobile exhaust.
4. Write the city landscape office. Find out how the city controls the cutting of trees on construction sites. How are areas replanted after construction -- by the developer, city or owner? Are green belts planned for Charlotte? Are there regulations regarding landscaping, including trees, in new sub-divisions?
5. Contact the agricultural extension service. Find out what urban conditions affect urban vegetation ( air pollution, compacted soil which won't allow air or moisture to be absorbed, root space restricted by buildings and sidewalks, etc.).
6. Build scale models of several sections ( residential, commercial, industrial or recreational) of a future city or expanded sections of Charlotte. Show how vegetation could more effectively be used to improve environmental quality.
7. Plan an urban vegetation awareness week. Call attention to the species of trees on the school ground. Publicize the importance of trees in cities. Write to the city landscaping office with suggestions for plantings in your neighborhood. Write the City Council suggesting how other areas of Charlotte could be improved by vegetation.

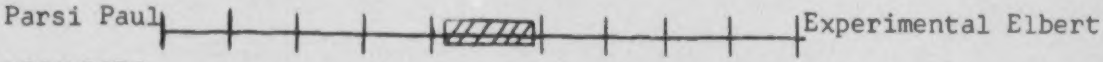
III. VALUES CLARIFICATION

A. Role Playing:

Each student chooses the name of a different plant or animal. He thinks about his choice for three minutes. He then justifies his choice with: "I am ___________(name of plant or animal). I help_____ (justify self or use). I do not want to be _______________because_____ _____." Do not explain the game until the students have chosen names.

B. Continuum:

Parsi Paul believes that all life is sacred and no one should kill any living creature. He eats no meat, will not swat a mosquito, and even steps around a cockroach. Experimental Elbert believes that the only way science can move ahead is to experiment on all living things, including people, even if it means death. Where would you place yourself on the line between the two extremes, closer to Parsi Paul or Experimental Elbert? How do you feel about the killing of animals for man's purposes?



## IV. RESOURCES

Books:

Science for Today and Tomorrow, Herman and Nina Schneider, D.C.Heath and Company, 1964.

Urbanization and Environment, Detwyler, Marcus and others, Wadsworth Publishing Company, 1972 ( for teacher).

Films:

"Force of the Earth", ERB, 17 mm, sound, 12 minutes, color.

"House of Man" Our Changing Environment", ERB, 16 mm, sound, 17 minutes, color.

# AIR POLLUTION-DIRTY AIR-PHEW,COUGH,UGH

Grades K–2

## I. INTRODUCTION

The air around us is dirty and must be cleaned up by 1976. The cost of controlling air pollution may be considerably less than the cost of air pollution. The costs of air pollution include: irritating smog, increased respiratory ailments, reduced visibility, building deterioration such as peeling paint, noxious odors, vegetation damage, rubber deterioration and clothing debasement. The control measures also pay off in more enjoyable life and better health. We have the know-how and the techniques to control most sources of air pollution -- all we need is the will to act.

What is air pollution? It is lots of things: a complicated collection of solids, liquid droplets, and gases.

In Metrolina, as in the nation, the major air pollutants are: particulates, carbon monoxide, the oxides of sulfur, hydrocarbons, nitrogen oxides, particulate matter, photochemical oxidants, and ozones. Metrolina houses two large steel fabrication plants, a large steel melting plant, zinc and aluminum smelting operations, one very large grey iron pipe foundry, sulfur base dye manufacture, numerous textile industries, rock quarrying and stone crushing, paper plants, a storage battery plant and several rubber processing plants. Commercial operations that are contributing to air pollution include power generating plants, stores, business building, hotels, laundries, dry cleaners in addition to approximately 200 public and semi-public buildings. There are 187,000 vehicles registered in Mecklenburg County alone.

Cities will not benefit much longer from the cleansing effects of the winds for the simple reason that the air itself is contaminated by man's pollutants.

Restoring quality to the air we breathe, ranks among the most challenging environmental problems of our time. We know that we can have cleaner air; the question is,"Will we do what we must to achieve it?""What can we do?"

We can refrain from burning trash in the open. We can make sure that our furnaces and automobiles work effectively. We can cut down on the use of the television, lights and other forms of energy. We can plant trees and support the maintenance of green areas and healthy oceans.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the end of a successful encounter, the student should be able to:

1. Tell about the causes of air pollution.
2. List several things that pollute the air (cars, airplanes, buses, refuse disposal, power plants.)
3. Be able to name a couple of diseases caused by air pollution (lung and heart ailments.)
4. Tell two effects of air pollution ( eyes burn and upsets breathing.)
5. Name several ways to do away with air pollution ( stop burning trash in the open, stop cooking out.)
6. Name a couple of items in the air that are environmental hazards (dust and gasoline fumes).

### B. Activities:

1. Take a walk in the neighborhood surrounding the school. What land is used by the automobile? ( Streets, service stations, driveways, parking lots, etc.)

2. Contact Mecklenburg County Health Department. Request information on air pollution. What causes air pollution? What air pollution which we can see? What air pollutants are invisible? What do you suppose causes most air pollucion in Charlotte? ( Automobiles.) Is smog only smoke or fog? (No).
3. Find out what air pollution does to you, your home and your community.
4. Find out about air pollution ordinances and laws in Charlotte and North Carolina.
5. Find out what air pollution causes there are in your community. Check traffic, industry, power plants, heating practices, refuse disposal.
6. Find out what kind of air you need to breathe and what kind of air you actually are breathing.
7. Look at films on air pollution.
8. Survey a busy intersection. How could automobile traffic be reduced? Are there safe places to ride bicycles and mini-bikes? What is the bus schedule? Visit a service station. Ask how emission can be reduced.

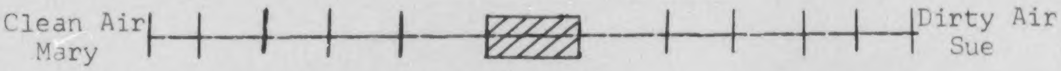
III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you would rather live in the city?
2. How many will buy a car when you are 18?
3. How many of you think the car is the major cause of air pollution in Charlotte?
4. How many of you like to smell rubber burning?
5. How many of you will roast hot dogs on a grill outside knowing it pollutes the air that we breathe?

B. Continuum:

Where would you place yourself on the line?



Mary is always trying to help clean up the air and thoughtful of others. She eats in the house at all times. Sue is careless and often wants to have cook-outs and burn trash.

C. Rank Order:

1. In what order would you place the following if you had to go on a shopping trip?
   a) Ride a bus
   b) Walk
   c) Ride in the car
2. Rank the following as to which would make you feel better"
   a) Smell rain
   b) Smell charcoal burning
   c) Fresh air
   d) Bus fumes
3. If you could choose where you like to live, which place would come first?
   a) In the city
   b) On the end of town
   c) Out in the Country

D. Role Playing:
Each student choose to be a form of transportation. He or she then justified his choice with, I am a or an ____________________ (name car, airplane, mini-bike, motorcycle, bus, train, bicycle, ship, etc.). I help____________________( justify self and use.)" I do not want to be __________ because __________."
Do not explain the game until the students have chosen a name.

IV. RESOURCES

*Air Pollution*, Addison-Wesley Publishing Co.,1971.
*Our Dirty Air*, Sarah M. Elliott, Messner, 1971.
*Environment and Man*, Richard Wagner,W.W.Norton and Company, 1971.
*People and Their Environment* -- Teacher's Curriculum Guide to Conservation Education 1-2-3, J.G.Ferguson Publishing Co., Chicago, Illinois.
*Environment Resources*, Pollution and Society,William W.Murdock, Editor.

Pamphlets:
*A Citizens Guide to Clean Air*
*Take Three Giant Steps to Clean Air*, Environmental Protection Agency, Washington, D.C.
*Metrolina Environment*, Mary Dawn Liston and James W.Clay, UNCC, 1974.

Kits:
*Environmental Kit*, available from Environmental Center.
*Air Pollution in Metrolina*, Slide Tray and Tape, available from Environmental Center.

Films:
"So Little Time ," 20 min., color, available at Environmental Center.
"Air All Around Us," McGraw-Hill, 8 min., B & W.
"The Air Pollution Menance," Society for Visual Education.

# WOW!! THAT'S DEAFENING

Grades 1-2

## I. INTRODUCTION

Sound is made by movement. It can be pleasant or distressing. A sound appealing to one individual may be revolting to another.

The decibel is the unit by which sound is measured and the measuring instrument is a soundmeter ( decibel meter). The sound meter registers low, safe, and unsafe readings.

What is an "unsafe" sound? Sounds which are excessive and have an undesirable effect on humans and are called "noise pollution."

Noise pollution can be so intense that it affects living organisms, including humans. (70 dB or higher for one hour or more can be harmful.) It can cause deafness, and it can cause wildlife to move from its natural habita

With industrialization and population growth sources of noise pollut are increasing daily.

Machinery, transportation and mass communications systems invade our lives. The results can be deafening!

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, students should be able to:

1. Distinguish pleasing sounds from noise.
2. Understand that individuals react differently to sounds.
3. Measure noise levels and draw conclusions about the levels of sounds which are unpleasant or injurious.
4. List sources of noise pollution.
5. Make suggestions for controlling noise pollution.

B. Activities:

1. Survey and measure amount of noise in various parts of the school and on the school grounds at different times during the day. Record on a map of the school and school community. Tape sounds in various areas. Identify sources of pleasant sounds. Identify sources of unpleasant noise.
2. Record information collected.

| Time | Photo or Sketch | Measurement of Sound |
|---|---|---|
| | | |
| | | |
| | | |

3. Discuss problems located and suggest possible solutions. Evaluate solutions and rank them from the most effective to the least effective. Prepare a plan to cut down on noise pollution. Share the plan with the school.
4. Noise show and tell: every day for a week listen for noises, especially irritating noises. Set aside a special time each day o tell about the noises you heard. Tell whether they were pleasant or unpleasant.

## III. VALUES CLARIFICATION STRATAGIES

A. Rank Order:

Have the children decide which of the sounds of each group they like the best to hear, next best, and least. Why did you rank them in th t order?

Radio
Stereo
Telephone

Bell
Drum
Horn

Scream
Bang
Crash

Wind
Rain
Snow

Car
Truck
Train

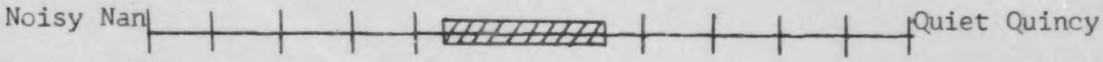
B. Values Voting:

Ask the children to make a sound without moving any part of their body. Now ask them to try to make a sound by moving some part of their body. Make a list of the ways you can make sounds. Have the children show by the following activities how they feel about certain sounds. Raised hand indicates that you like the idea. Thumbs down indicate that you do not like the idea. Crossed arms indicates that you have no strong feelings.

Do you like to talk?
Do you like to talk out loud?
Do you like to whisper?
Do you like to snap your fingers?
Do you like to clap your hands?
Do you like to cough?
Do you like to click your tongue?

C. Continuum:

Discuss with the children Noisy Nan who loves music and Quiet Quincy who loves quiet. The teacher would have prepared a large continuum for the floor. The children are to choose where on the continuum they should stand to indicate their feelings.



IV. RESOURCES

Teachers Books:

Program Learning Aid for Introduction to Environmental Science, Phillips W. Foster, Learning Systems Company, 1972.

Noise Pollution, Patrick A. O'Donnel, Charles W. Lavaroni, Addison Wesley Publishing Company, Inc., 1971.

Clarifying Values Through Subject Matter, Merrill Harmen, Howard Kirshenbaum, Sidney E.Simon, Winston Press,Inc. 1973.

Pamphlets:

Noise Pollution, U.S.Government Printing Office, August,1972, U.S. Environmental Protection Agency.

Noise: The Unseen Enemy, M. Barbara Scheibel

Pollution Examining Your Environment, Wentworth,Couchman,MacBean Stecher.

Books for Children:

The Country Noisy Book,Margaret Wise Brown, Harper Brothers, 1940.

Films:

"Pandora's Easy Open Pop Top Box",16 mm, 15 minutes, color

"Your Ears," 7 minutes, color, Encyclopedia Britannica

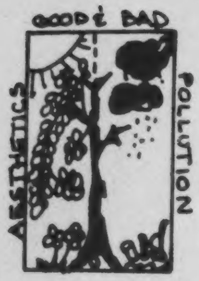
U.S.Public Health Service:

"Noise - Polluting the Environment", 16 mm, 15 minutes

"Noise", 16 mm, 10 minutes, color

Game:

"The Planet Management Game", Houghton-Mifflin



# THE EYES HAVE IT

### Grades 3–4

## I. INTRODUCTION

Man has always relied on his eyes to show him the world in which he lives, but do we really see what is around us? Many of us see only what we wish to see, or simply overlook things which seem unimportant to us.

Since pictures communicate some ideas better than words, the camera or sketch can be utilized as an additional method or tool to assist in the quest for comparisons and awareness of our surroundings.

The eye and the camera obtain pictures in similar ways. Each has a lens to focus the image. The iris of the eye and the diaphragm of the camera each regulate the amount of light received. The retina of the eye and the film of the camera are each sensitive to light. The eye of the camera and the body enables us to obtain knowledge, appreciate beauty and enjoy the things around us more fully. The eye measures only one-inch across, but it makes the visual world almost limitless to man.

A picture is drawn with rays of light in both the eye and camera.

The big question is, why do we not see what is really around us? The camera or sketching will help draw this point in focus for us as we become more conscious of our surroundings and the importance of the eye. Flexibility and diversed grouping will assist this encounter become a very real success and hopefully meaningful at the same time.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the end of a successful encounter, the student should be able to:

1. Compare and illustrate the human eye to the camera.
2. Identify with vivid awareness and understanding the good and bad ecological areas around them.
3. To perceive with understanding what they actually see and appreciate beauty in nature.
4. To develop responsibility for beautification projects and use of camera equipment and cost involved or sketching materials.

### B. Activities:

1. Take a walk around your school and observe good and bad ecological areas. Take pictures or sketches of these areas as you go on your walk.
2. Ask each child to list, draw, etc., what they saw on the walk immediately upon return to the classroom. This may be done as you are taking the walk.
3. For a comparative study, make a display of drawings, lists, etc., made by the children and the actual photos or sketches taken on the walk.
    a) Learn how the eye and camera operate.
    b) Make a model eye.
    c) Make a model camera.
4. Make a collage or mural of the ecological order around your school.
5. Use some good ecology practices through paper drives, collection of returnable bottles, etc., to make money to pay for the class project.
6. Plan a beautification campaign with your class and carry it out according to the direction of the children.

## III. VALUES CLARIFICATION

A. Brain Storming:

1. Divide into small groups; discuss/list five major good and bad ecological practices we saw, then present to the total group for discussion and finalizing of class list of the ten most important good and/or bad areas observed.
2. Discuss ways you might beautify your school grounds. Identify some things you would like to do as a class project and place them in Rank Order. Allow for participation between all students and teachers, and/or individual activities in addition to class projects.

B. Values Voting:

1. Did you see what the camera saw?
2. Are you willing to work to make your school most beautiful?
3. Is beauty really important to you and your surroundings?
4. Have you learned anything you did not know about really seeing what is around you?

C. I Learned That:

I was pleased to find that ______________________________.
I was displeased to find that ______________________________.
From this study I learned that ______________________________.
The new thing, I learned was ______________________________.
The part that was most interesting was ______________________________.
I was surprised to find that ______________________________.

## IV. RESOURCES

Books:

Concepts in Science, 4, Brandwein, Paul F., Harcourt, Brace and World, Inc., New York, 1966.

World Book, Field Enterprises Educational Corporation, Chicago, Illinois, Vols. 15 and 6, 1974.

Films:

"A Nation of Spoilers," color, 11 min., E-J, Alfred Higgins Production, 1964.

"Your Eyes," B-10 min., E-J, McGraw Hill Textfilms, 1947.

Filmstrips:

"My Senses and Me," Part I: "What do I see when I Look?", Encyclopedia Britannica Educational Corporation, 425 N. Michigan Ave. Chicago, Illinois, 60611.

"Perception," Argus Communications, 7440 North Natchez Avenue, Niles, Illinois 60648.

# SH-HHH Grades 3-4

## I. INTRODUCTION

When we speak of noise pollution, what may seem a pleasant sound to one person may, in reverse, aggravate someone else. Man in his complex environment has developed devices which produce sound. When these sounds reach certain proportions, people begin to feel uneasy and want help to eliminate the terrible sounds which at this level have become noise. Noise pollution has been labeled a twentieth century problem.

Noise is classified in the polluting category when it begins to endanger health and property. When sound reaches this frustration point, then we have a noise pollution. Noise can disturb man's emotional level in such a way that he will sometimes react suddenly, and often without thought. Between 6 and 16 million workers in the United States earn their livings under noise levels which are hazardous to their health. As a result of high intensity noise, these people are often the unlucky recipients of ear damage or mental confusion. In other words, physical and mental health bear the weight of noise pollution. Noise is with us all the time. Even when we are asleep, noise can be a pollutant so that we cannot rest because of the unpleasant sounds.

The most obvious noise producers are construction equipment and transportation vehicles, especially aircraft. Even labor-saving convenience products used around and in the home produce noise levels which can be harmful.

Unlike the situation with other environmental pollutants, the know-how exists to abate and control most noise sources. Improved product design, realistic ordinances and zoning and revised building codes are some of the ways that we can reduce noise pollution.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the end of a successful encounter, the student should be able to

1. Be aware of sound, both pleasant and unpleasant. Know what makes a pleasant sound suddenly becomes a noise pollutant.
2. Develop a vocabulary related to sound. Such words as, volume, pitch, tone, decibel, sound waves, and noise should be included.
3. Through research, be able to know effects of what noise pollution can do to mental and physical aspects of life.
4. Be aware of ways that children can help cut down on noise pollution.
5. Become aware of resources of noise pollution.
6. Be able to measure noise levels at different locations, and to realize that a person's proximity to the noise has a bearing on one's reaction to the noise.

### B. Activities:

1. Write a short story on pleasant sounds you hear everyday. Then contrast this by having children write a story on unpleasant sounds. What makes the sound unpleasant? Use film, "Sound All Around Us."
2. Take an environmental hike. Close eyes and listen for pleasant and unpleasant sounds. Open eyes and listen for sounds again. (The list of sounds will vary with closed and opened eyes.) Did you see the sound in operation, or just hear it? When did sound appear most appealing to you? Use adaptable parts of kit on "Sound and Noise."

3. Divide class in half. Blindfold half of class and let others be leaders. Take students on a trust walk to places on school premises where noise could be a pollutant. Record reactions on a small chart.
4. Play a record player at normal volume. Keep increasing volume. Jot down your reactions.
5. Have children make a list of noise pollutors in and near their homes. Help them work out a chart to control these noise-makers. Examples: 1) stop yelling and talk softer; 2) cut television off or turn volume down.
6. What is sound? Noise? Use a taperecorder sound level indicator if a sound meter is not available. (Environmental Center has a meter.) Any noise above 80 decibels produces physiclogical effects. With that information, compare sound of some of the following using the devices mentioned: 1) conversation (60); heavy traffic (80); a moving train (100); a rock band (100-138); a jet at close range (150); use other examples in and around the school. Make a chart to show distance from you, decibel reading, place, and your reaction to the sound.
7. Rewrite a popular song with new words that carry a message of noise pollution.
8. Take a short walk outside and draw a picture of five pleasant sounds and five unpleasant sounds. When back inside, show film, "Your Ears."
9. Noisy garbage trucks are a disturbance. These trucks can be built with sound-deadening equipment for approximately $ 100.00 per truck. If you lived in a city that bought 10 of these trucks, how much would the extra device cost on these trucks? For fun: Charlotte actually has 100 garbage trucks in the city. How much would it cost the taxpayers to have this sound-deadening device installed on all their garbage trucks?
10. Write down sounds that give you a feeling of cold, curious, alarmed, angry, hungry, eager. Put a describing word in front of each.
11. Have children perform an exercise in complete silence, then repeat the same exercise in loud noise. Use film, "Pandora's Easy Open Pop Top Box" as a conclusion. Discuss.

III. VALUES CLARIFICATION STRATEGIES

A. Values Voting:

1. How many of you would like to live next to Douglas Airport?
2. How many of you would like to play in a combo band every night?
3. How many of you would prefer to live in the wide-open country?
4. How many of you would want to hear people talking loudly after you have gone to bed at night?
5. How many of you can study if a radio or TV is going full force?

B. Rank Order:

1. If you were a mechanic and could put a device on vehicles to reduce noise, would you --
   a. Try to solve the problem by putting on the sound-deadening device?
   b. Leave the vehicle alone?
   c. Leave it for another mechanic to do?
2. If you were at a birthday party, would you choose to hear --
   a. Loud music being played all the time.
   b. Soft music being played all the time.
   c. No music at all.

C. Role Playing:

1. Pretend you are a city planner and there is money to reduce noise

pollution. How would you help correct the problem?

2. Pretend you are a parent. How would you go about controlling noise pollution around and in your home?
3. Pretend you are a worker in a noisy factory. Describe noise pollution and what it is doing to your physical and mental health.

D. Composition:

Have each person in the class write City of Charlotte and tell them about dangers of noise pollution. Let them know that physical and mental problems result because of noise pollution.

E. Twenty Things:

List 20 noise pollution sources. Cross out the 4 you could do without. Circle the 4 most important to you. What did you find out about yourself?

F. Debate:

Divide the class in half and discuss why you feel this way about noise pollution. Some issues are as follows:

a. Does the environment have a relationship to noise pollution?
b. Do people make noise without being aware of the situation?
c. Do you consider noise pollution as major as air and water pollution? Why? Examples.

IV. RESOURCES

Books:

A Teachers Guide: Ten Minute Field Trips, Helen Ross Russell, J. G. Ferguson Publishing Company, 1973.

Clarifying Values Through Subject Matter, Merrill Harmin, Howard Kirschenbaum, Sidney B. Simon, Winston Press, Inc.,1973.

Values Clarification: A Handbook of Practical Strategies for Teachers and Students, Sidney B. Simon, Leland W. Howe, Howard Kirschenbaum, Hart Publishing Company, 1972.

Noise and Man, William Burns, Lippincott, 1969.

Sound -- From Communication to Noise Pollution, Graham Chedd, Doubleday, 1970.

In Quest of Quiet, Henry Still Stockpile Books, 1970.

The Flight for Quiet, Theodore Berland, Prentice-Hall, 1971.

Noise Pollution, Patrick O'Donnell and Charles W. Addison, Wesley Publishing Co., 1971.

The Tyranny of Noise, Robert Alex Baron, St. Martin Press, 1970.

Quiet Crisis, Stuart L. Udall, Discuss-Avon.

Booklets:

Teachers Guide for Environmental Education, Task Force on Environment and Natural Resources in cooperation with the North Carolina Department of Public Instruction.

Environmental Education: Problems, Projects and Exercises, Division of Science Education: State Department of Public Instruction, 1972.

Earth Bound: Communications in Environmental Education, Debbie Badgley, ESEA Title III Project.

Environmental Education Instructional Unit on Pollution, Department of Public Instruction, Raleigh, North Carolina.

Environmental Education Instructional Materials and Resource Guide, (Charlotte Nature Museum.)

Educational Experiences Program, "Noise Pollution," Judy Keener, Environmental Ecological Education, Burke County Title III.

A Guide to Environmental Education Resources, Division of Science Education, North Carolina Department of Public Instruction, Raleigh, North Carolina.

Kits:

Environmental Ecological Education, Our Environment 2: "Sound and Noise." Consists of 2 filmstrips, 2 records, a wall chart and teacher's guide --Intermediate Grades.

Part 1. Noise and You
Part 2. Quiet Please

"United Pollution Kit," Environment and Pollution Education (Stone's Southern School Supply.) Includes transparencies, teacher's guide and 25 student handbooks.

Noise Color Band Meter B: R-Deck (available through The Environmental Center, Charlotte Nature Museum.)

Films:

"Noise -- The New Pollutant," b/w, 16 mm, AVC.
"Sound All Around Us, " 16 mm, Coronet Instructional Films, 1954.
"Pandora's Easy Open Pop Top Box," color, 16 mm, 15 minutes, HEW.
"Your Ears," Color, 7 minutes, Encyclopedia Britannica.

# "REAL KILL" Grades 3-4

## I. INTRODUCTION

We are at the brink of economic and ecological chaos in pest control. The insects are beating us in the competition game and have forced us into an environmentally damaging strategy.

The importance of highly effective pest control will increase as the booming human population creates a greater demand for food and protection from disease-bearing and nuisance insects. We cannot continue to use ecologically crude insecticides in an inefficient, disruptive, and pollutive manner if we are to avoid ecological disaster. There is a great need to use specific control techniques that are alternatives to chemical control. This includes biological, genetic and cultural methods.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of a successful encounter, the child should be able to:

1. Realize that indiscriminate use of pesticides can upset the balance of our ecosystem.
2. Be familiar with the following terms: pesticides, food chain, soluble poison, predator, and conservation.
3. Discuss long-range effects of pesticides such as DDT on wildlife.
4. Discuss alternatives to pesticides, realizing that pests are becoming increasingly resistant to pesticides.

B. Activities:

1. Have students bring household product packages that contained pesticides. Examples are: shelf paper, household sprays, Shell No-Pest Strips, flea collars, mothballs, insect repellent, etc. Make a display of the pesticides.
2. Discuss these questions about the products brought in.
   - -What are the ingredients in each product?
   - -What is the pesticide use for?
   - -What warnings are listed on the product?
   - -Should the products be used carefully?
   - -How do the ingredients kill their victims?
   - -What alternatives do we have to using the products in our homes?
3. Have students bring newspaper and magazine articles on pesticides. Make a file of these articles.
4. Contact the local N.C.Department of Agriculture. Ask for materials on pesticides.
5. Invite a pest control representative to speak to the class.
6. Write to the National Wildlife Federation, 1412 16th Street, N.W. , Washington, D. C. Request information pesticides.
7. Have a debate between two groups. One group will represent those for pesticide, the other will represent those against pesticides.

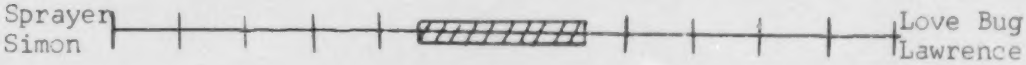
## III. VALUES CLARIFICATION

A. Values Voting:

1. Would you use insect spray if you found 2 or 3 flies in your home? Would you use a fly swatter instead?
2. How many of you would use a strong pesticide on a diseased tree in your yard if you thought the pesticide might damage other plants in your yard?

B. Role Playing:
An environmentalist wants the farmer to use soft pesticides on his crops instead of one of the hard pesticides, such as DDT. The farmer would need to repeat the spraying often with the soft pesticide.

C. Continuum:
Where would you place yourself in the use of household pesticides?



D. Baker's Dozen:
Have the students list 13 pest control measures. Circle the 3 you think are least dangerous. X the 3 you think are most dangerous.

Below is a suggested list:

1. Praying Mantis
2. Sevin
3. Ant Powder
4. Ladybug
5. DDT
6. Frog
7. Aphid
8. Fly Spray
9. Green Lacewing
10. Roach Tablets
11. Pilot Bug
12. Chlordane
13. D-Con

IV. RESOURCES

Filmstrips:
"Pesticides," C 797-5, SVE

Pamphlets:
"Pesticides and Your Environment, John Carey Stone, National Wildlife Federation, Washington, D.C., 1972.
"Pesticides," Donald L. Dahlsten, Scientists Institute for Public Instruction, New York, 1970.

Books:
Pests and People, Lawrence Pringle, Macmillan Co., 1972.
Pesticides and the Living Environment, Robert L. Rudd, University of Wisconsin Press, 1964.
Silent Spring, Rachel Carson, Houghton Mifflin, 1962.
The Environmental Handbook, edited by Garrett DeBell, Ballantine Books, New York, 1970.
The User's Guide to the Protection of the Environment, Paul Swatek, Ballantine Books, New York, 1970.

Grades 3–4

# AESTHETIC AWARENESS OF WATER POLLUTION

## I. INTRODUCTION

There actually is no shortage of water on the earth today. We have exactly the same amount of water today that was on the earth 50, 500, or 50,000 years ago. There is, however, a water wastage, largely as a result of people's abuse of their environment.

As population, industry, and urbanization increase, so does water pollution. This pollution increase is the major factor responsible for water wastage. Nature for many years has been able to cleanse her waterways by natural means, but due to increased misuse and abuse, streams, rivers, ponds, lakes, and the oceans are losing their viability.

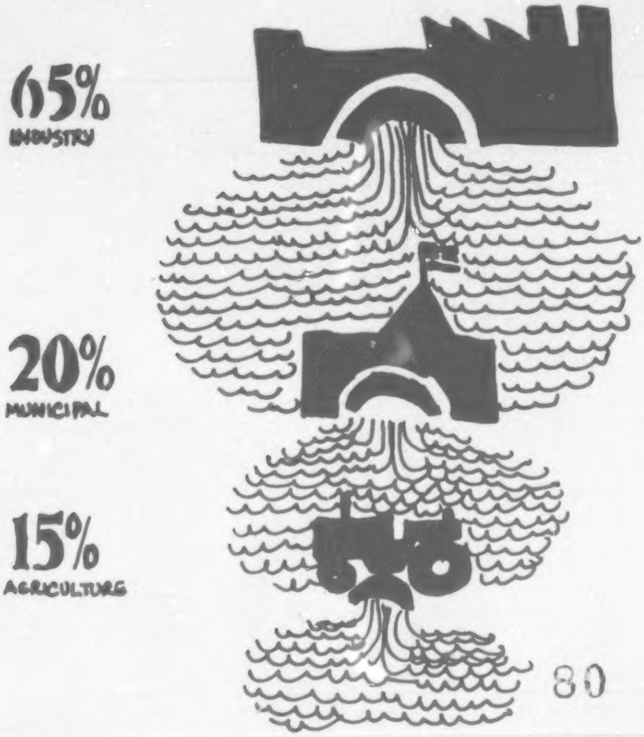
North Americans are removing fresh water from underground sources twice as fast as the hydrological cycle can replace it. Europeans three timea as fast. At the present rate, Americans will need 700 billion gallons of underground water per year in 1980; only 650 billion will be available.

If our streams are not up-graded locally, it is doubtful if they will ever be productive. Freshwater plants and animals are succumbing to siltation, chemical poisoning and eutrophication. Even though wastewater treatment facilities are being up-graded, it is the small businesses, industries, and individuals that are defouling our local waterways.

Students need to understand that water pollution affects our drinking water supply, recreation, needs of other plants and animals, as well as the aesthetic value.

**THE VILLIANS**

Water using industries discharge 3 to 4 times more oxygen-demanding waste then entire U.S. sewered population. Industrial waste grows faster than other water pollution - 60% of 1970 total, 65% of 1971's. Big offenders: producers of paper, organic chemicals, petroleum products, steel.



## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of a successful encounter, the student should be able to:

1. Name several causes of water pollution.
2. Explain some of the effects of water pollution.
3. Recognize why some of our water is not fit to use.
4. Know what we mean by "polluted" water.
5. Suggest ways to eliminate water pollution.
6. To see how clean water is important to all of us.

B. Activities:

1. Have pupils collect in a jar some water from different places in community (streams, ponds, puddles, gutters, etc.). Shake up the samples and observe each under a bioscope. Shake up the sample and place a teaspoon of each in separate dishes. Let the samples evaporate, then look at the dishes.

What does this show about water pollution? What are some of the causes of the polluted water?

2. Have children collect pictures that show misuse of land and streams and discuss what might be done to prevent this waste. Ask questions: What would you do first to stop the pollution of our rivers, streams, lakes, etc.? What is meant by marshy water? How does it smell? What may cause marshy water to be polluted?
3. If possible, find pictures showing dead fish. What kind of pollution may have killed these fish? Discuss ways to prevent other fish from dying in like manner.
4. Make a list of ways in which our city may be increasing water pollution.
5. Invite someone from our city government to talk with the class about methods used to treat sewage.

## III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you like to swin in the ocean?
2. How many of you like to swim in a lake?
3. How many of you like to swim in a public pool?
4. How many of you would choose not to live in a desert where getting water could become a major problem?
5. When you are hot and thirsty on a summer day, how many of you would rather have a drink of cold water than Kool-aid?

B. Continuum:

Where would you place yourself on this line?

Clean Jean

Dirty Marty

Clean Jean feels so strongly against the continued practice of polluting our lakes, beaches, streams, etc, that she would rather live on a desert.

Dirty Marty is not concerned about pollution so he prefers to play around the polluted water.

## IV. RESOURCES

Book for Teacher:

A Guide to the Study of Freshwater Ecology, William A. Andrews, Prentice-Hall, Inc., 1972.

Teacher's Curriculum Guide to Conservation Education: Grades 4,5,6, Matthew J. Brennan, J.G.Ferguson Publishing Co., 1968.

Books for Children:

An Introduction to Pollution, Harold E. Schlichting, Jr., and Mary Southworth Schlichting, Steck-Vaught Company, 1972.

Algae, Harold E. Schlichting, Jr. and Mary South Schlichting, Steck-Vaughn Company, 1971.

Ecology: The Study of Environment, Harold E. Schlichting, Jr. and Mary Southworth Schlichting, Steck-Vaughn Company, 1971.

Pamphlet:

Needed: Clean Water, A Scriptographic Booklet, Channing L.Bete, Inc. 1964.

Filmstrips:

"Waste Disposal for the Community", EBF.
"Water for the Community ", EBF.
"Wise Use of Water Resources", UNF.
"Let's Explore a Stream", Cor.
"Water and Its Work", McGraw-Hill.

Film:

"The River Must Live", Shell Oil, 16 mm, color, 17½ minutes.

Kit:

"Our Environment: Problem or Promise", A.J.Nystrom & Co., 1972.

# DESIGN WITH NATURE

### Grades 4–6

## I. INTRODUCTION

Nature has always been a source of inspiration for man. Man has written stories, songs, and poems about the beauty of nature. Some of the world's greatest music and art were inspired by nature. He has always gone to the mountains, the seashore, and other areas to enjoy nature, to rest, and refresh himself.

As a social creature, man has always polluted his environment. He removes the things he needs and wants from the environment and adds residues to it as he seeks housing, food, clothing, and relaxation for his family. As long as the population density was low the environment could accommodate these alterations, but as the populations increased, these changes became a serious threat. For example, in the last decade our population rose 13% while the demands for goods and services rose 60%.

The problem of crowding becomes ever more serious. By the year 2000 it is expected about 70% of our population will be jammed into 10% of the land space made up of 12 giant metropolitan areas. The Atlantic seaboard will have 1,000 people per square mile.

The pressures on builders, and city planners becomes greater. With the problems of crowding, air pollution, noise, traffic jams and schools there is the increasing demand for parks, more green areas with trees and flowers. The overcrowding also affects our national parks. In the Sixties, visitors to park areas increased over 150%. Land use planning is a must. Man must work with nature to protect the balances that keep our earth a beautiful, abundant home.

Man alone has the capacity to remake and change his environment. This carries with it a great responsibility. Since man can destroy nature's wonders, he must now plan with nature and in doing this, he protects his environment.

## II. ENVIRONMENTAL OBJECTIVES

A. Behavioral Objectives:

At the end of a successful encounter a child should be able to·

1. List several man-made obstructions to natural beauty.
2. Recognize and appreciate artistic designs in nature by presenting examples from poetry, art, music or enjoyment of nature as recreation.
3. Express his awareness of the beauty of nature by telling of things he has observed.
4. Explain why we should leave plants and animals undisturbed in special areas by listing examples.
5. Share his appreciation for Local, State, and National Parks, Forests, Campsites, Zoos, and other areas of natural beauty by finding out why these areas have been created and what each of us can do to help keep them beautiful.
6. Recognize man's and other animal's dependency upon nature.

B. Activities:

1. Take a walk around the school to observe wooded areas and to observe man-made obstructions to the beauty of nature. Make a list of what you observe for Class Discussion.
2. Do some research on your community as a bird sanctuary. In Charlotte, this would include Winghaven and other gardens.
3. Visit the Nature Museum and go on the Nature Trail. Make a list of things you observe.

4. Make a list of places in and around Charlotte where a person could go to see the beauty of nature; such as parks, gardens, etc.
5. Investigate and discuss Charlotte's efforts to save the natural surroundings by replanting trees, shrubs, flowers, and grass in areas where they have been disturbed or destroyed.
6. Find information about the State Zoo. Give the slide presentation. Find ways we can take part in this project.
7. Draw trees, flowers, landscapes, and other things that show the beauty of nature. Cut snowflakes and mount on cardboard.
8. Research the Sugar Creek Canal Project and list the pro's and con's. How has this project been designed with nature in mind? Write the San Antonio Chamber of Commerce to find out about their canal.
9. Research State and National Parks and Forests. Report findings. Discuss how these areas are used and what we should do to preserve them.
10. On a large North Carolina map, locate areas that have been set aside to preserve natural beauty. These may include Wilderness Areas, Wildlife Preserves, Forest Preserves, Campsites, and any other natural area you think we should include.

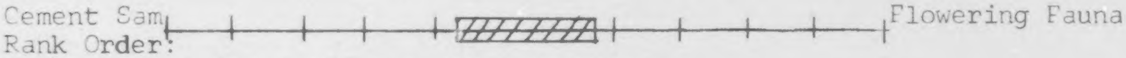
## III. VALUES CLARIFICATION

A. Role Playing

You have discovered a place that you feel is so beautiful it should be preserved as a State Park. Present your reasons to the State Board so that you convince them to do so.

B. Continuum:

Where would you place yourself on the following:



C. Rank Order:

Rank in 1, 2, 3, 4 order as to importance:
1. Money for completing the State Zoo.
2. Money for the Sugar Creek Canal Project.
3. Beautify streets by replanting trees and flowers.
4. Money to build a playground.

D. Debate:

Resolve that Charlotte should go ahead with the Sugar Creek Canal Project and complete it as soon as possible.

## IV. RESOURCES

Books and Pamphlets:

Adventures in Environment, National Environment Education Development Program, Silver Burdett Company, Atlanta, 1971.

Hibbs, Albert R., The Environmental Sciences, Ecology, Environment, and the Biosphere, Laidlaw Brothers Publishers, Atlanta, 1974.

McCue, George, Ecology, Benziger, Inc., New York, 1971.

Our Living Land, Numbers 3,5,6,7, Department of Interior Environmental Reports, Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402.

Slide Program:

"North Carolina Zoo Slide Presentation," Mr. Doug Aitken or Mr. Joe Millsap.

# KEEP ON BUGGIN

Grades 5–6

## I. INTRODUCTION

What do you think of when you hear the word, "insect"? Roach? Fly? Mosquito? True, some are pests, but less than 1% of the 800,000 species of insects are harmful. Humans probably could not live if all insects were destroyed.

Helpful insects include bees, wasps, butterflies, grasshoppers and other pollinators. Many fruits and flowers depend on insects for the reproduction of seeds. So do vegetable crops such as peas, carrots and onions. The interrelationship of insects to plants is necessary. The insects feed on the pollen or nectar and this enables the plant to make seeds. Without pollinators, most of our food plants would be grasses.

Many insects are predators --feeding on harmful insects. The praying mantis eats mosquitos and the ladybug kills several kids of crop-destroying insects.

Ants are a good example of soil-conditioners. The soil is enriched by their waste products and decaying bodies within the ground. Many insects clean up the land by feeding on dead animals and animal wastes.

Insects are tremendous manufacturers as well. The honeybee is one of our most useful -- supplying man with honey and wax. Shellac comes from a substance given off by lac insects from India, and silk is made by silkworms in Japan.

Students must be aware that some insects are necessary, while others are pests, and why. Controls are needed when insects endanger health, damage crops, spoil foods, and ruin household furnishings. A few examples of these invaders are silver fish, boll weevils, cockroaches, flies, fleas, and mosquitos.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

The student should be able to:

1. Discuss how insects help to balance nature.
2. Identify an insect by its major characteristics ( six legs, three body parts, and a segmented body).
3. Understand that some insects are helpful and others are harmful.

B. Activities:

1. Have the students make a question box, "How Much Do You Know?" concerning insects. Each student could find the answer to at least one of the questions about the major characteristics.
2. Draw and label an insect to show its familiar characteristics -- 3 body parts, 6 legs, and segmented body.
3. Set up an insect cage with a praying mantis. Discuss whether this insect is helpful or harmful. Where did it come from and why?
4. Take a walk around the school to observe and collect insects. [illegible] a net and collect as many different insects as possible. Insects may be killed in a killing jar or taken back alive to make an insect zoo. Some insects could be mounted and other preserved in alcohol. Students could try to identify and decide if the insects are harmful, helpful, or both.
    a) Observe the activity around an anthill. Do the ants notice one another? What are they trying to do?
    b) Study the beauty and design of a butterfly. A group could set up butterfly collections.
    c) Discuss the interrelationship of insects and flowers.

5. Make posters on how insects are helpful to man. They are pollinators, predators, soil-conditioners, manufacturers, and food for other animals.
6. Experiment by putting out pieces of food to see how long it takes an insect to discover it. How long did it take them to clean up the food? This would help emphasize the importance of insects as a clean-up crew.

III. VALUES CLARIFICATION

A. Baker's Dozen:

List 13 ways that insects are valuable to man.
   a) Mark through the 3 that are least important to you.
   b) Circle the 3 that are most important to you.

B. Word Association:

Show the students several pictures of different insects and have them write down in five seconds three words that come to mind. Ask for volunteers to give their responses and an explanation.

C. Debate:

Divide up the class and have the students take a stand on "Insects--Good vs Bad."

IV RESOURCES

Books and Pamphlets:

Ten-Minute Field Trips, Teacher's Guide, Helen Ross Russell, J. G. Ferguson Publishing Company, Chicago, Illinois, 1973.

Exploring and Understanding Insects, Barbara J. Collins, Benefic Press, Westchester, Illinois, 1970.

People and Their Environment, Teacher's Curriculum Guide to Conservation, grades 4-5-6 ed., Matthew J. Brennan, J. G. Ferguson Publishing Company, 1968.

World Book Encyclopedia, Field Enterprises Educational Corporation, c. 1974, Vol. 10.

Films:
"Ants:" EBF, 11 min, b/w
"Bees": U. W. F., 22 min, b/w.
"Insects" : EBF, 14 min., color.

Filmstrips:
"How Insects Live and Grow," SVE, B.C., A 464-3
"Let's Explore a Garden," SVE, B.C., A423-2

Kits:
"This Earth: Everything Fits Together," Guidance Associates, 1973.

# BUG ME-BUG ME NOT

Grades 5–6

## I. INTRODUCTION

Man has always felt that he was supreme in the animal kingdom and has neglected to realize that the insect has been his true challenger and competitor. The insect is greater in number, diversity, and adaptability, than his competitor -- man.

Man, however, has actually played into his competitor's strength by relying overwhelmingly on chemical controls -- insecticides and pesticides.

Pesticides are not always harmful. They have helped combat dreaded diseases in both man and lower animals. They have increased the yield in crops. These are known as the "soft pesticides."

However, it is with the "hard pesticides" that major damage occurs. They are poisons and poisons kill. Some of these "hard pesticides" such as DDT, have a long-lasting effect on the environment, and it is these pesticides that are disrupting the food chain and entire ecosystem.

There is a great need for more research in environmentally safe insect controls.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Be able to define terms such as pesticide, food chain, insecticides, soluable poison, ecosystem.
2. Explain how some pesticides are beneficial to man, while others are not.
3. Name several harmful pesticides that lead to complete disruption of the ecosystem.
4. Name several control techniques could be used as alternatives to chemical control.
5. Explain how the harmful pesticide, DDT, can be carried by winds and ocean currents to all parts of the globe.

### B. Activities:

1. Research how some harmful insecticides disrupt the food chain and contribute to the increase of endangered species.
2. a) Have each child bring in a combination of household packages from sprays, animal flea collars, insect repellents, moth balls, etc.
   b) Ask students the following questions while passing items around the room:
      1. What is the name of the product?
      2. What are the ingredients?
      3. What are the pesticides being used for?
      4. What warnings are listed on the label?
   c) Discuss the findings with the class.
      1. Do you know that these ingredients kill their victims?
      2. Do you know that these ingredients affect the food chain?
      3. What alternative insecticide could you have used?
3. Set up a debate between two groups. One group presents the "pro" side of the use of pesticides; the other group will present the "con" side.
4. Invite a resource person to visit your class, an ecologist or a representative from the Conservation Department to discuss pesticides.

## III. VALUES CLARIFICATION

A. Alternative Search:

Have students list some ways that will eliminate harmful insects in the ecosystem. Beside this list, draw three columns and ask students to check the column which best describes their attitudes toward the suggestions.

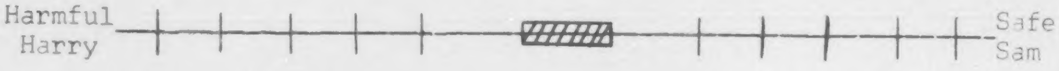
| LIST | TRY IT | CONSIDER IT | I WON'T |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

B. Values Voting:

1. How many of you, or your parents, would use harmful pesticides?
2. How many of you will continue to use them?
3. Do you feel that harmful insecticides should be replaced with natural controls?
4. How many of you would use natural controls if you had a choice?
5. How many of you would eat fish, meat, or vegetables knowing that they had been sprayed with harmful insecticides?

C. Continuum:

Where would you rate yourself as a user of DDT and other harmful pesticides?



D. Role Playing:

You are a conservationist and are concerned about the increasing amount of endangered species of fish and animals due to the use of harmful pesticides. You are trying to convince the manufacturer of your fear.

E. Creative Writing:

Write a story or draw a picture about a plant that was sprayed with DDT and how this plant changed the food chain.

## IV. RESOURCES

Filmstrips:

"Pesticides," (sound), C 797-5, SVE

Pamphlets:

"Pesticides," Donald L. Dahlsten, Richard Garacia, John E. Laing, Robert Von de Bosch, A Scientists' Institute for Public Information Workbook, 30 East 68th Street, N.Y.N.Y.10021, 1970.

"Environmental Handbook," ed. by Garrett DeBell, Ballentine Books, Inc. Intext Publishers, New York, 1970.

"User's Guide to the Protection of the Environment," Paul Swatuk, Ballantine Books, Inc., Intext Publishers, New York, 1970.

"DDT and the Food Chain," Deborah S. Badgley, Environmental Education Center, 13 Veterans Drive, Oteen, North Carolina, 28805.

Books:

Pesticides and the Living Land, Rudd, University of Wisconsin, Wisconsin Press, Madison, Wisconsin, 1964.

Pests and People, Pringle, MacMillan, New York, New York.

That We May Live, Whitten, D.Van Nostrand Company, Inc., Princeton, New Jersey, 1966.

# WANTED: LOUD OR SOFT

Grades 5–6

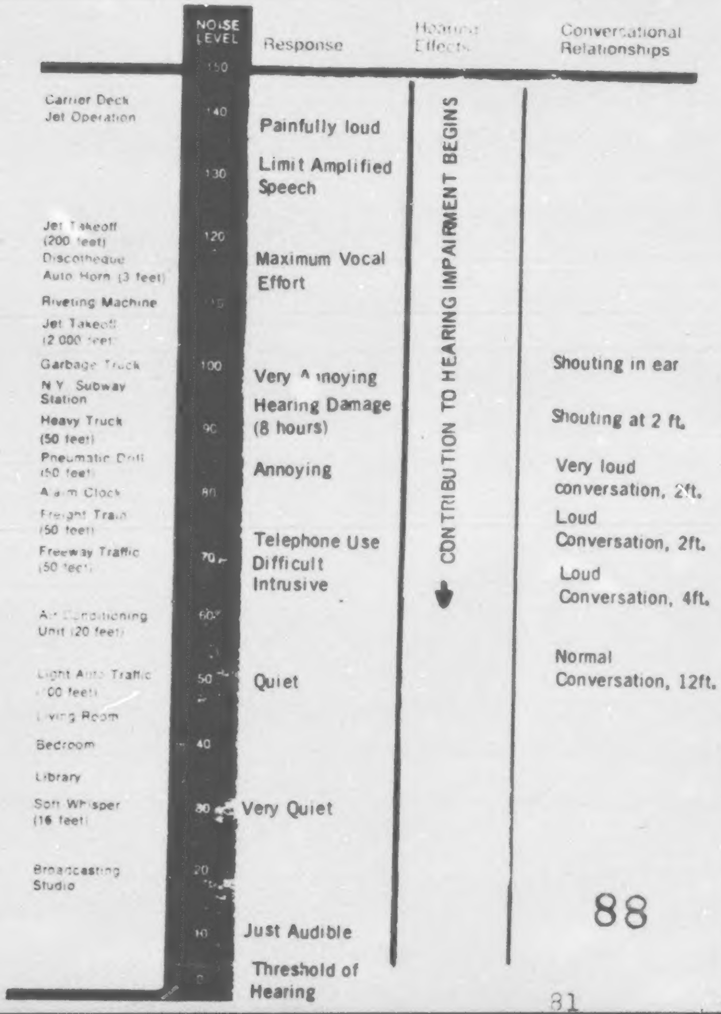
## I. INTRODUCTION

Man has relied upon his sense of hearing for information about his environment and social communication throughout time. Density of population, technological development, and urbanization have influenced the amount, quality, and occurrence of sounds which are not always beneficial. Noises are not only annoying distractions but may produce hearing loss, industrial accidnts; social problems, job inefficiency, property devaluation, educational interference, and indeterminate plant and animal problems.

Measurement of sound cannot be definite, but the chart reflects studies of average noises on a scale. Sounds from various sources are measured in decibels (dB) as registered by the human ear.

The study and control of noise pollution is relatively new in our country though sound has been studied previously. Since we cannot see the effects, it is difficult to secure control. One way is to reduce the source by more careful design, muffling, or addition of parts to lessen noise. Another is through control of its transmission by insulation or absorption. A third way is through controlling operating procedures as scheduling office machine use, rerouting heavy traffic, or highway designs.

**Sound Levels and Human Response**



## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

1. Understand and review vocabulary as sound, noise, intensity, pitch, decibel, acoustics, sonic, ultrasonic.
2. Be aware of the sources of noise inside the school, in a residential area, in a business and/or construction site.
3. Collect and understand data on the effects of noise.
4. Help plan means to control noise pollution.

B. Activities:

1. What is sound? Noise? How is it measured? Inventory the school grounds and the community to determine sources of sound. Secure a floor plan of the building and a map of the surrounding area. Measure sounds in all areas of the school. Use a tape recorder sound level indicator if a sound meter is not available. Measure sounds on the grounds and surrounding community. Make a chart

of Sounds and Measurement, recording the data to include: Place, Time, Source, Distance from you, Decibel reading, and How did you act when you heard the sound?

2. How can sound be used and controlled? Discuss methods of reducing noise in each location of sounds measured for chart. Could bypasses and designated truck routes protect residential areas from noise? Do trees and shrubs buffer against noise? Could traffic noise be better controlled from the source and by buffers? Are the laws regulating mufflers on automobiles, motorcycles, minibikes enforced? How are noise abatement laws enforced?
3. Contact the Mecklenburg Building Inspection Office, an architect or a planner. Discuss building codes regarding architectural design and planning. Are there specific requirements for insulation, landscaping, room placement, proximity to other buildings,etc.?
4. If possible, visit an industry or a commercial area. Study machinery noise and its affect on employees. Are ear shields required? Are insulation materials used in walls, ceiling, floors?
5. Collect magazine advertisements on noise producing products. Is noise equated with power? Are there warnings about potential hearing loss?
6. If possible, visit a residential area surrounding the airport. Are residents affected by noise? Are there regulations about building in the airport area?
7. Write the Environmental Protection Agency. Are there laws regulating noise? How are they enforced?
8. Develop a plan to help eliminate noise pollution. Share the plan with others in the school, parents and others who might be interested.

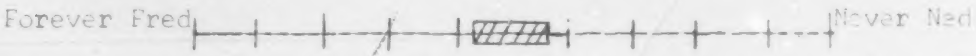
## III. VALUES CLARIFICATION

A. Values Voting: (use technique as outlined in introduction for "Valuing the Environment")

1. How many would like to live downtown on Tryon Street?
2. How many would like to play the drums?
3. How many would like to live beside Douglas Airport?
4. How many would like to live on a farm near Matthews?
5. How many would like to live beside I-85?
6. How many would like taking a test on stage at lunch time?

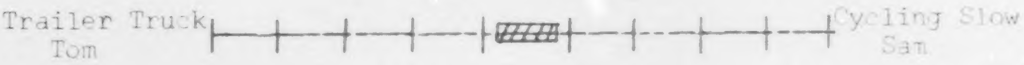
B. Continuum:

1. If you could play a transistor radio anywhere any time, where would you place yourself?



2. If you could talk as loud as you desire at lunchtime, where would you place yourself?

3. If you could choose a vehicle to ride to Monroe, where would you place yourself?



C. Rank Order:

1. If you could choose where to sit at a school band program, where would you sit?
    a. ____Near the stage
    b. ____Midway
    c. ____Back of the room
2. If you could choose a musical instrument to practice for one hour a day, which would you choose?
    a. ____Violin
    b. ____Flute
    c. ____Piano
3. If you chould choose a place to live, where would you rather live?
    a. ____Beside an all night store
    b. ____Across from a fire station
    c. ____Next door to a shopping mall

D. Rank Order:

How loud or soft? Rank the following sounds from the softest (1) to the loudest (10).

1. Car horn____
2. Your home____
3. Alarm clock____
4. Library____
5. Jet takeoff____
6. A whistle____
7. Whisper____
8. Rock/Roll band ____
9. Drilling/Sawing____
10. Loud radio ____

E. Values Rating Chart:

On large bulletin board construct the following chart. Use large tagboard strips and print sounds such as a jet taking off, school library, home, etc. Have the children draw an ear on a piece of construction paper and cut it out. Label it with each name. Place a sound on the top of the chart as it lies on floor or is pinned to a board. Let several children put their "ears" on a line at a time and then tell their reasons why they placed them there.

Good ________________________________ Bad
Valuable ________________________________ Worthless
Strong ________________________________ Weak
Fast ________________________________ Slow
Loud ________________________________ Soft
Ferocious ________________________________ Peaceful

F. Values Auction:

Here are six items to be sold at auction to the highest bidder. Print money in five and ten dollar denominations. Conduct the auction as would be held in public. Use the following rules to guide you: (1) You have none of these items. (2) You have $ 100 to spend. (3) You can spend no more than $ 50 on any one item. (4) Bids must open at $ 5 and move no more than $ 10 at a time.

On a separate piece of paper each student should record their highest bid and the top bid for the item.

Items:
1. Love and popularity of friends
2. Minibike
3. Long life with excellent senses
4. Complete stereo with tapes/records
5. A chance to stop sickness and poverty
6. An automobile

## IV. RESOURCES

Books:

Clarifying Values Through Subject Matter, Merrill Harmin, Howard Kirschenbaum, Sidney B. Simon, Winston Press, Inc., 1973.

Introduction into Environmental Science, Phillip W. Foster, Roger H. Hermanson, Learning Systems Co. of Richard D. Irwin, Inc., 1972.

Man's Impact on the Environment, Thomas R. Detwyler, McGraw-Hill Co., 1971.

Noise Pollution, Patrick O'Donnell and Charles W. Addison, Wesley Publishing Co., 1971.

Values Clarification: A Handbook of Practical Strategies for Teachers and Students, Sidney Simon, Leland Howe, Howard Kirschenbaum, Hart Publishing Co., 1972.

Science 5, George G. Mallinson and Others, Silver Burdett Co., 1968, Chapters 18-20.

The Tyranny of Noise, Robert A. Baron, St. Martin's Press, 1970.

The Fight for Quiet, Theodore Berland, Prentice-Hall, 1971.

Noise and Man, William Burns, Lippincott, 1969.

Sound - From Communication to Noise Pollution, Graham Chedd. Doubleday, 1970.

In Quest of Quiet, Henry Still, Stockpole Books, 1970.

Pamphlets:

"Quiet", U.S.Environmental Protection Agency, Washington, D.C.

Films:

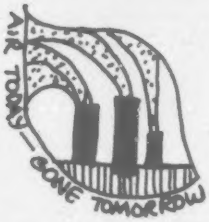
Let's Clear the Air, 16 mm., National Medical Audiovisual Center. Film Distribution, Chamblee, Georgia 30005.

Sounds All About Us, 16 mm, Coronet Instructional Films, 19[illegible].

Learning About Sound, 16mm, Encyclopedia Britannica Educational Corp., 1955.

Magazines:

"Audubon", The National Audubon Society, 950 Third Avenue, New York, New York, 10022, May, 1974.



# THE SNOW MUST GO ON

Grades K-2

## I. INTRODUCTION

Clouds are composed of tiny droplets of liquid water that has condensed as the water vapor in the atmosphere has cooled. In order to condense, water vapor must have a nucleus around which to form. The nuclei may be salt, grain, dust, or other particulate matter in the air. If the condensation occurs in air in which the temperature is below freezing - snow is produced. Each ice crystal grows by capturing and freezing water which evaporates from nearby water droplets. In this way the ice crystal grows large enough (becomes heavy) to fall. If the temperature of the air, through which the crystal falls is cool enough it falls as snow, if not - rain. Let's see how snow affects life.

Snow and ice form "Islands in the Sky" which are mountains with their own populations of living plants and animals that can survive only in these areas. For instance, the white mountain butterfly can only live on the very top of snow covered mountains. How does snow falling through the air affect you? Do you cause snow?

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the end of a successful encounter, the student should be able to:

1. Describe how water travels through the air.
2. Distinguish the effect of temperature differences on precipitation.
3. List several ways man puts the nuclei in the air that is necessary for snow formation.
4. Know how snow affects man.

B. Activities:

1. Put a wet circle on the chalkboard with a damp cloth. Discuss where the water is going. What would happen if we could cool the upper layer of air in the room?
2. Light some birthday candles. Hold a metal spoon over the candles. Let the students observe the carbon on its surface. Blow the candles out and observe what is going into the air. Go outside and observe a smoke stack. Can you tell the direction of the wind?
3. When it is snowing, go out collect and observe snowflakes. They have been called the lace of the air. Return to the classroom and create some lace out of tissue paper don't forget the nucleus ( see introduction.) and string it around the room when the snow has stopped build a snow man, or build one out of cotton in the classroom.
4. Create a collage of snowflakes, the kinds of activities that man does that provides the nuclei for snow and the affects upon plants and animals.

## III. VALUES CLARIFICATION

A. Continuum:

Where would you place yourself on the line?

Snowy Benny |---|---|---|---|▨▨▨▨▨|---|---|---|---| Sunny Jenny

Snowy Benny would like for it to snow every day of the year. Sunny Jenny wants the sun out every day and never wants it to snow.

B. Role Playing:
Several students are white mountain butterflies, others the snow, others the mountain top, and others want to remove the snow so that they can camp out on the top of the mountain without getting too co and wet.

IV. RESOURCES

Books:

Understanding Your Environment, Burdett Company, 1972.
Modern Earth Science, Holt, Rinehart and Winston, Inc., 1973.
People and Their Environment, J. G. Ferguson Publishing Company, 197
The Life of the Mountain, McGraw-Hill Book Company, 1969.

Filmstrips:

"Finding Out About the Clouds," SVE

# SOMETHING'S IN THE AIR

Grades 3–4

## I. INTRODUCTION

From the time that man first controlled fire, air pollution has been a problem. Caves of early man were blackened by smoke. Roman togas were blackened by soot and in 1273, King Edward I of England banned the burning of fuel which produced excessive smoke. The industrial revolution produced new sources of air pollution. Air became a free garbage dump for airborne industrial wastes. Increasing populations and increasing urbanization ( more and more people living closer and closer together) aggravated the problem because air pollution is a man-made problem.

The biggest contributor to air pollution is the automobile. Approximately half of the air pollution in the United States, by weight, is produced by the automobile. The burning of other fuels also contributes to the problem.

What is air pollution? It is lots of things; a complicated collection of liquid droplets, gases and particles. Some air pollution you can see, some you can't. Often the latter is the most dangerous.

The most noticeable air pollution is the graying of the skies. It's caused by particles, primarily smoke, soot and fly ash. Such wastes are produced by the burning of a fuel in factories, power plants, and homes.

Of the 50,000 tons of pollutants which people in the Metrolina dump into the air each year, almost one-half is an invisiable poisonous gas, carbon monoxide. Dangerous concentrations of carbon monoxide can occur in areas of heavy truck and automobile traffic. Long exposure to carbon monoxide can slow reaction time produce fatigue and affect mental functioning. Carbon monoxide cannot be seen and has no odor.

Automobiles also released unburned hydrocarbons and nitric oxides into the air. In the presence of sunlight, these substances become the smog makers. Sunlight changes these pollutants photochemically. Brownish, irritating smog results.

Sulfur dioxide is a dangerous pollutant and is produced when fuels containing sulfur ( coal and oil) are burned. Under certain conditions, sulfur dioxide combines with water vapor in the air and it becomes an acid, sulfuric acid, which acts corrosively on statues, building, and clothing. It also damages living plants. Often farming is not possible in areas near refineries and smelters which are sources of sulfur dioxide.

The dangers of air pollution are not fully understood, but there have been great air pollution disasters in London and the United States. As air pollutants build up over cities, death from respiratory ailments soa. The very young and the very old and those already suffering from respiratory diseases are the most susceptible.

States have established levels for the amount of pollutants that can be released from exhaust pipes of vehicles. It is hoped that very soon the levels of pollutants in all areas of North Carolina can be within the standards.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the end of a successful encounter, the student should be able to:

1. List several components of air pollution.
2. Discuss the sources of air pollution.
3. Explain some of the effects of air pollution.
4. Suggest ways to eliminate air pollution.

B. Activities:

1. Contact the Mecklenburg County Health Department. Request information on air pollution. What causes most of the air pollution in the United States? What causes air pollution which can be seen? What air pollutants are invisible? What are the effects of air pollution on humans? Plants? Buildings made of marble or limestone? Paint? Clothing? What do you suppose causes the most air pollution in Charlotte? ( Automobiles. Charlotte is the most automobile-oriented city east of the Mississippi.) Is smog merely smoke or fog? (no)
2. Take a walk in the area near the school. Note the sources of air pollution. Test automobile exhaust by using waxed paper vaseline smeared collector paper. Place collector paper on various playground posts. Note areas of highest visible air pollution. On a map of the area near the school, list things which can produce air pollution.
3. Survey a busy street. how many people are there in each automobile? How many riders are in each? Record problems related to urban traffic. Record number of buses or other alternative methods of transportation.
3. Using a map of the area, indicate land used by automobiles. What is the impact of the automobile on the land in the area? How could this amount of land be reduced?
4. Study automobile design, describing the function of design. Investigate installing emission control systems in all cars by writing letters to the three major car manufacturers in Detroit.
5. Collect automobile advertisements from magazines. Discuss selling strategies. Are there important points; e.g., air pollution or gasoline mileage.
6. Visit or contact in writing the Charlotte Traffic Department and/or the Charlotte-Mecklenburg Planning Commission. Collect information on mass transit. Collect information on bicycle paths.
7. Draw up a plan for controlling air pollution produced by automobiles. Suggest ways to limit the use of automobiles ( car pools, mass transit, etc.). Discuss plan with parents and other students. Write letters to people who might be interested in the plan. Make charts and posters explaining the plan.

III. VALUES CLARIFICATION

A. Values Voting:

1. How many would rather live in the city?
2. How many think cars should be allowed to pollute?
3. How many feel that the city of Charlotte should maintain a mass transit system?
4. How many will buy a car when you are 18?
5. How many think laws should be enforced to protect our air?
6. How many would rather ride a horse than in a car?
7. How many think you will ride a bicycle as an adult?

B. Continuum:

Where would you place yourself on the line?

Riding Ronnie Walking Willie

Riding Ronnie always rides his minibike to school even though it has a faulty exhaust. Walking Willie walks to school and every place that he goes.

C. Rank Order:

1. In what order would you place the following if you had to go to the shopping center?

   - a. Walk
   - b. Ride a bus
   - c. Ride a minibike
2. If you were going to the other side of the city, which would you use?
   - a. Ride a bicycle
   - b. Ride in a car
   - c. Ride a bus
3. If you had adequate transportation, in what area of Mecklenburg County would you prefer to live?
   - a. Rural community
   - b. City
   - c. Suburb

D. Role Playing:

Mr. Smog drives to work alone every day and refuses to catch the bus that comes by his house. He has a faulty exhaust pipe on his car and his carburetor needs blown out. Mr. Clean tries to persuade Mr. Smog the dangers of his car and how he is affecting his environment.

IV. RESOURCES

Books:

Environment and Man, Richard Wagner, W. W. Norton & Company, 1971.

# AIR TODAY, GONE TOMORROW

Grades 5–6

## I. INTRODUCTION

It is difficult to view the modern American scene without an automobile in it. In this country there is one automobile for every two and one-half people for a total of 85 million automobiles. If trucks are included, there are as many vehicles in this country as there are automobiles in the rest of the world combined ( 100 million).

Automobiles are far and away the most serious abusers of the air and most inefficient users of the land. In addition, they are the number one cause of air pollution in the United States ( 40 to 50 per cent). In some cities, they are responsible for as much as 85 per cent of the air pollution.

It is carbon monoxide, hydrocarbons and nitrogen oxide spewing from automobiles which cause human discomfort and intensify respiratory disorders. Carbon monoxide reacts with the hemoglobin of the blood and robs the body of oxygen. Exposure to low levels over long periods of time slows reaction time and can affect judgment.

Hydrocarbons and nitrogen oxides are the "smog causers." In the presence of sunlight, they react chemically producing new more irritating and more damaging air pollutants. Residents of Los Angeles know this "photochemical smog" well and Charlotte is not without "photochemical smog."

The threat the automobile poses to urban America is not a threat to the air alone. Automobiles are urban land grabbers, contributing to urban sprawl. Doxiadis, the Greek urban planner, suggests that the radius of cities is generally not longer than a 15 minute trip from the city center.

Modern transportation systems have made it possible for cities to expand far beyond earlier limits. In the process, increasing amounts of land are consumed by the transportation system.

In Minneapolis, 50 per cent of the land is devoted to the automobile. In downtown Los Angeles, it's 66 per cent. Charlotte is the most automobile - oriented city east of the Mississippi and ranks sixth in cars per capita in the United States.

The American love affair with the automobile must be curtailed to some extent. Automobiles consume about 50 per cent of the petroleum products refined in the United States. Comparing gasoline consumed per passenger mile, cars are less than one-half as efficient as buses and airplanes are only one-fifth as efficient as buses.

Automobiles certainly won't pass from the scene, but it's time to reconsider alternative modes of transportation. The massive highway building program which successfully tied the nation together with ribbons of interstates, now threatens to strangle urban areas with asphalt freeways and concrete parking lots.

There are alternatives to the automobile. Answers include the building of clean, convenient urban mass transit systems. Gasoline tax monies build interstates and urban freeways. Many insist that gasoline taxes should be used for rebuilding mass transit systems rather than allowing the construction of more and more freeways in urban centers.

Individuals must begin to make commitments to change -- to push for and use mass transit systems, to promote bicycle paths, to use automobiles with discretion, and to consider gasoline consumption when buying new automobiles.

At present, the love affair is not over. There are two cars produced for every baby born.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the completion of a successful encounter, the student should be able to:

1. Identify problems associated with the use of automobiles in the city.
2. Identify the automobile as a source of air pollution.
3. Explain how the automobile affects land use in cities.
4. Describe ways air pollution can be prevented.
5. Discuss the advantages and disadvantages of alternative methods of transportation.
6. Be able to name some chronic diseases caused by air pollutants.

B. Activities:

1. Take a walk in the neighborhood surrounding the school. What land is used by the automobile? ( streets, service stations, driveways, garages, parking lots, etc.) Do residents usually use an automobile, bus, bicycle or walk? What problems does the automobile present? Do neighborhood residents walk or bicycle? Why or why not?
2. Survey a busy street or intersection. Record size of automobiles and number of people riding in each. How could automobile traffic be reduced? Are there places to safely ride bibycles? What is the bus schedule? How many people ride buses in Charlotte? Why or why not? Visit a service station. Discuss how automobile emissions can be reduced.
3. Report your findings regarding air pollution in Charlotte to others in the school and community. On a map of Charlotte, locate each parent's place of work. Suggest how they could form car pools. Map the homes of teachers. Could teachers find other ways to get to work? Write a letter to the Charlotte City Coach Lines, Inc., suggesting how they might attract more customers. Write a letter to the editor of a Charlotte newspaper telling why more people should be encouraged to ride buses.

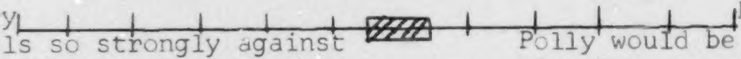
III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you like to watch logs burn in a fireplace?
2. How many of you like to smell rubber burning?
3. How many of you prefer outdoor barbecuing on hot summer days to eating in an airconditioned restaurant?

B. Continuum:

Harry Airy



Polly Pollute

Harry feels so strongly against air pollution that he wants to live in an air tight balloon.

Polly would be content to live in a tent beside a smoke stack.

C. Rank Order·

1. If you could choose where you could sit one night to watch stars, how would you rank the following?
   a. Near an airport.
   b. Near a busy highway.
   c. On the beach.
   d. In a pasture.
2. Rank the following as to which would make you feel best.
   a. Bus fumes
   b. Fresh air
   c. Smell of rain
   d. Smell of charcoal burning.

D. Composition:

1. Pretend you are an author. Write a composition about air pollution in ten years.

## IV. RESOURCES

Books:

Air Pollution, Addison-Wesley Publishing Company, 1971.
Our Dirty Air, Sarah M. Elliott, Messner, 1971.
Pollution, Wentworth, Couchmen, McBean, Stechner, Mine Pub., Inc. 1971.
Pollution, Examining Your Environment, Mine Pub., Inc. 1971.

Filmstrips:

Pollution - America's Urban Crisis. Society for Visual Education.
The Air Pollution Menace. Society for Visual Education.
Road to Run, A.O. Mowbray, J.B. Lippincott Company, 1969.
Man and the Environment, Arthur S. Boughey, Macmillan Co., 1971.
Air Pollution, World Health Organization, 1961.
Air Pollution Aspects of Emission Sources: Electric Power Production, Office of Air Programs, Environmental Protection Agency, GPO, 1971.
Community Action Program for Air Pollution, National Association of Countries, NAC, 1966.
Guide for Control of Air Pollution Episodes in Medium Sized Urban Areas, Office of Air Programs, GPO.
Long Term Effects of Air Pollution, A Survey Center for the Environment and Man, Order No. PO-193-001, N.T.I.S.
The Source of Air Pollution, Dept. of Health, Education & Welfare, 1966.

Filmstrips:

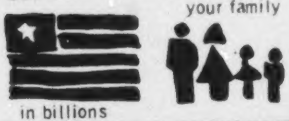
"America's Urban Crisis," Society for Visual Education, color.
"The Air Pollution Menace," Society for Visual Education, color.
"The Transportation Crisis," Popular Science, 1955, color. (Char.-Meck Schools).
"The Ecological Crisis," Society for Visual Education.

Kit

Environmental Kit ( available from Environmental Education Center).

### DIRTY AIR COSTS YOUR FAMILY $309 PER YEAR

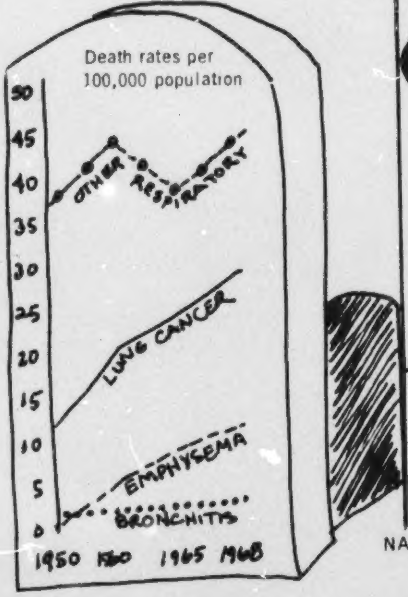
Average American's share is $80 per year.



| U.S. Cost in billions | Cost for your family | |
|---|---|---|
| $6.1 | $117 | Cost to human health |
| $5.2 | $100 | Cost to residential property |
| $4.7 | $90 | Cost to materials |
| $0.1 | $2 | Cost to vegetation |
| $16.1 Billion Total | $309 Total | |

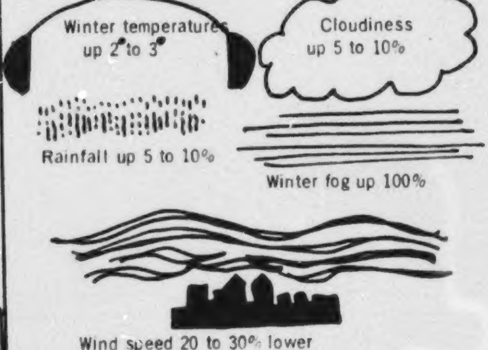
### AIR POLLUTION KILLS

Death rates from diseases associated with air are climbing.



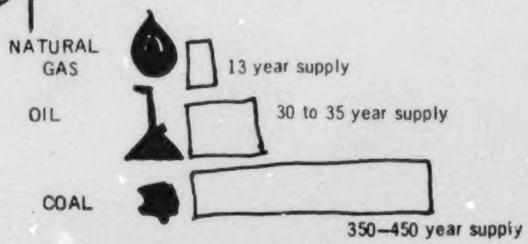
### POLLUTION CHANGES CLIMATE

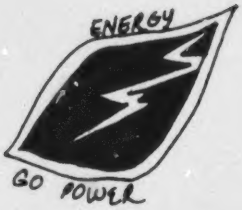
Cities create thermal mountains, making cities warmer and wetter. La Porte, Ind., downwind from Chicago steel mills, has rain and snow increases that match peaks in steel production.



### CLEAN FUEL IS SCARCE

Federal air standards will require 15% more clean-burning natural gas. Demand tripled in last 20 years. known world reserves will last only 13 years. Gasification of coal should help some.





# YOU AND ENERGY

## Grades K–2

I. INTRODUCTION

Energy is produced in many forms. Between 1950 and 1970, consumption of energy resources in the United States doubled, growing twice as fast as the population was growing. As a result there are shortages of some of the fuels, and consumer prices for energy use is rising. It is now every individual's responsibility to practice energy conservation. However, energy does mean power, and in the sophiscated life that is prevalent in the United States, it is difficult to adjust lives using less power. There have been many suggestions on how to cut down and with the energy crisis of 1974, people are at least thinking along these terms.

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Become aware of energy use at home and school.
2. Become aware of energy wastes at home and school.
3. Become aware of sources of energy.
4. Become aware of ways to conserve energy.

B. Activities:

1. Take a tour around the school to discover objects that use energy. Return to classroom and illustrate objects using energy.
2. Take a tour of your home; list all objects that use energy and list what you could do without.
3. Make a collection of pictures showing objects that consume energy.
4. List 5 ways you conserve energy at home and school.

III. VALUES CLARIFICATION

A. Values Voting:

1. How many think you should turn off the TV when you're not watching?
2. How many think it is wasteful to take more food on your plate than you can eat?
3. Do you insist on mother bringing you to school when you could walk?
4. How many would take a shower rather than a tub bath to conserve the amount of water used?
5. Should you turn off lights when you leave the room?

B. Baker's Dozen:

Children: List 13 things at home that use energy. Underline those that you can't do without. Cross out three that you can live without.

C. Rank Order:

1. What do you think is the most important?
   a) TV
   b) Stove
   c) Lights
2. What do you think is the most important?
   a) Electric lights
   b) Potatoes
   c) Gasoline

IV. RESOURCES

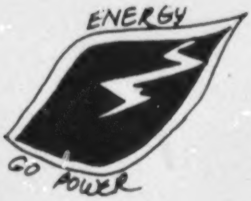
Books:

People and Their Environment, edited by Matthew S. Brennan, 1972.
Science 2, Silver Burdott, Morristown, New Jersey.

Filmstrips:
"Our Minerals and Energy Resources," Coronet Films.
"Mineral Conservation Today," SBE
"The Ecology of Farming," McGraw-Hill Book Company.
Phamplets:
"Home Energy Saving Tips," The National Bureau of Standards,
U.S.Department of Commerce.

# POWER TO SPARE

Grades 1-2



## I. INTRODUCTION

The year, 1973, was one in which our elected officials and mankind in general came to a realization of the need for energy conservation. Fuel supplies began being controlled and rationed in many aspects of life. Controls were requested among individuals in homes, schools, recreation, and industry. Such controls were so necessary because of the increasing consumption of energy resources in the U.S. Between 1950 and 1970, U.S. consumption of energy resources doubled, growing twice as fast as the population growth rate. Even though our President declared there were adequate fuel resources, they were being produced at a slower rate than necessary to meet consumption demands. These energy producing resources, except for atomic energy, will likely continue to be produced at a declining rate than necessary to meet future demands. Therefore, individuals must be aware of energy consumption. Hopefully such an awareness will bring about greater effort and concern for ways to reduce consumption.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Understand that energy is produced by fossil fuels.
2. List ways in which people use energy daily; i.e., appliances, transportation.
3. Name some of the fossil fuels which man uses for energy.
4. Discuss ways energy is wasted.
5. Discuss methods of conserving energy.

B. Activities:

1. Survey the classroom. How many things in the room need electricity? Map electrical appliances in the room. Discuss where electricity comes from. Name things in the room which required electricity of fossil fuel to be manufactured. Name things which did not require electricity of fossil fuels to be manufactured. Discuss how electricity could be conserved in the classroom.
2. Survey other parts of the school. Ask the custodian how the school is heated. Where does electricity enter the school? Where else in the school is fuel or electricity used? Discuss how fuel energy could be saved.
3. Investigate how students use fuel to get to school, in their recreational activities, at home. Photograph, draw or collect pictures of items and activities which require fuel or electricity.
4. Make a bulletin board using pictures to classify different uses of energy. Make a chart showing the types of ways we use energy. Example:

| Appliances | Transportation | Recreation |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

5. Use an experience technique to stress the act of depleting the source. ( Example: Let the student drink up a limited supply of Coke.) Help students see from the experience how we use up our

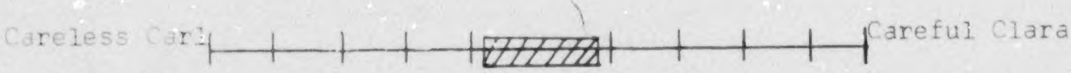
natural resources. Discuss that we are depleting fossil fuel when we waste energy.

6. Make a station using a dry cell, wire, light bulb, and a door bell. Let the children experiment with these items to discover various facts.
7. List possible methods of conserving energy at school, at home. Evaluate methods of conserving energy and rank from most efficient to least efficient. Make school aware of energy conservation. Practice energy conservation.

## III. VALUES CLARIFICATION

A. Continuum:

Construct a continuum large enough to put on the floor. Have the children decide which they would be most like. Careless Carl who never bothers to turn the stereo, TV, radio, lights, etc.off when he is through using them or Careful Clara who always takes time to cut off appliances when she has finished using them even if the house is on fire.



B. Rank Order:

Have the children look at a group of three pictures of things that use energy. Give the following instructions. Color the picture of the thing you like to use best red. Color the picture of the thing you like to use next best blue. Color the thing you like to use least green.

## IV. RESOURCES

Books:

Clarifying Values Through Subject Matter, Merrill Harmes, Howard Kirschenbaum, Sidney Simon, Winston Press, 1973.

Energy and Power, Robert Irving, Alfred A. Knopf, N.Y. 1959.

Teaching for Survival, Mark Terry, Ballantine Books, Inc., 1971.

# ENERGY CONSERVATION

Grades 3-4

## I. INTRODUCTION

Available fuel resources on this "Spaceship Earth" are limted or finite. It is true that new coal and oil deposits are being discovered, but the rate is so slow that these resources must be considered non-renewable resources -- resources which will not replenish themselves as plants and animals do, and as water through the water cycle does. The per capita demand for energy in the United States is Skyrocketing. Between 1950 and 1970, U.S. consumption of energy resources doubled, growing twice as fast as the population was growing. An alarming fact: Americans consume for air conditioning the same amount of power that all 800 million Chinese need for everything.

Fuel Consumption in the U.S.

| Year | 1970 |
|---|---|
| Household | 19% |
| Industrial | 41% |
| Transportation | 25% |
| Commercial | 14% |
| Other | 1% |

We have large supplies of coal in this country, but our supplies of oil and gas are not abundant. To protect ourselves from shortages we must control use of energy resources and individuals must learn to conserve energy.

The automobile is a big consumer of fuel. Twenty-five per cent of the fuel used in the U.S. is used for automobiles and other types of transportation. Per passenger mile, cars are less than one-half as efficient as buses, and airplanes are only one-fifth as efficient as buses.

Much heat is lost by buildings which are poorly insulated. Appliances consume varying amounts of power, measured in watts. Electrical energy is not nearly as efficient as burning fuels directly. It requires twice as much fuel to heat electrically as by gas or oil. In North Carolina customers used many more KWH annually per customer than customers in cities of similar size throughout the nation as a whole.

We are all part of the "energy crisis", because in our daily lives we use great amounts of energy, much of which we are unaware of. It is in the individual's responsibility to become aware of individual energy consumption, and consciously curtail consumption.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter the student should be able to:

1. Discuss energy consumption in the school, home and community.
2. Describe energy waste in home, school and community.
3. Discuss laws passed to conserve energy. (55 m.p.h. speed limit, 68 degree thermostats in winter, 78 degree thermostats in summer.)
4. Describe ways to conserve energy in the home.
5. Have an awareness and understanding of major energy producing sources in this country. Examples: water, sun, atomic, gas, and oil, coal, steam (geothermal).
6. Understand where these energy sources are found in the U.S.

B. Activities:

1. Take a walk around the school and neighborhood. Observe ways energy is used or consumed. Observe meter box and discuss its purpose.
2. In the library, research the amounts of energy various appliances use. For example: The Charlotte Observer, November 14, 1973, issue had an article on "One Family's Plan to Save Energy."

3. Illustrate one way there is an energy waste in your home, school or community.
4. In the library, research ways to conserve energy. For example: turning off lights when they are not in use, or turning off the TV and any electrical toy when you are not using them.
5. Discuss new laws passed to conserve energy.
6. Look at filmstrips entitled: "Wealth in Oil," "Oil: From Earth to You", " Water Pressure at Work", and " A Visit to Yellowstone National Park"
7. Locate on a large class map of the U.S., energy sources -- oil, coal, steam (earth), nuclear sources, gas (natural), and major dams (hydroelectric.)

III. VALUES CLARIFICATION

A. Values Judgement:

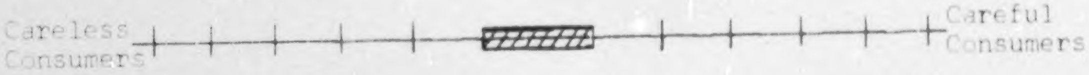
Ask the students to make a list of at least twenty items at home that use electricity. Beside this list draw five columns and label, Very easily, Easily, With some difficulty, With great difficulty, and Impossible. Ask the students to check the column which best describes their attitudes. There are no right or wrong answers.

B. Rank Order:

1. If you were rushing out to school, and had a chance to do one thing before leaving, how would you rank the following:
   a. Make up your bed
   b. Turn the light in your room off
   c. Water a plant
2. If you were eating breakfast, and needed more light, how would you rank the following:
   a. Turn on the overhead light
   b. Open the shutters or draperies
   c. Eat in the dark
3. If you were in a classroom that was 68 degrees, and you were cold, rank the following:
   a. Push the thermostat up
   b. Put on a sweater
   c. Complain
4. If you needed to go to the shopping center which was near your house, how would you get there? Rank the following:
   a. Get your mother to take you
   b. Walk
   c. Ride your bike
5. If your father works downtown and is thinking of the best plan for fetting there, rank the following:
   a. Drive alone in his car
   b. Join a car pool going downtown
   c. Get his wife to take him and pick him up daily

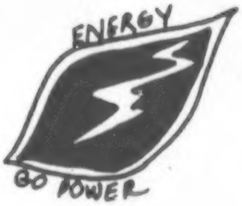
C. Continuum:

Since you have learned about energy consumption, mark your family as to how they feel about energy conservation.



## IV. RESOURCES

Pamphlet:
North Carolina Public Schools, Vol. 38, No. 3, 1974.
Newspapers:
"Help a Bunch During the Fuel Shortage", Mini Page, January 28, 1974.
"One Family's Plan to Save Energy", The Charlotte Observer, November 14, 1973.
"Why the Energy Shortage?", Mini Page, January 28, 1974.
Filmstrips:
"Wealth in Oil,"Ency. Brit.
" Oil: From Earth to You", The American Petroleum Institute.
"Water Pressure at Work," Filmstrip of the Month Club.
" A Visit to Yellowstone National Park", Eye Gate House.
Report:
N.C.Utilities Commission Report, 1972.



# FUEL AS ENERGY

Grades 5-6

## I. INTRODUCTION

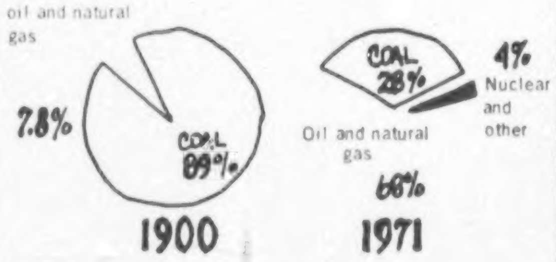
From prehistoric times man has been dependent on his ability to turn energy into power. Most of man's energy, and hence power, comes from the sun. The fossil fuels; coal, oil products and has were once living plants and animals, which trapped the sun's energy by the process of photosynthesis. Fossil fuels are being produced now but the rate of production is so slow that they are classified as non-renewable resources. Uranium, which is used in the production of nuclear power, is produced by the decay of radioactive elements in the earth's crust and is also subject to depletion.

Man's rate of consumption of energy has increased tremendously since the advent of the industrial revolution. Between 1950 and 1970, U.S. consumption of energy resources doubled with an annual average growth rate of 3.5 per cent -- more than twice the population growth rate. Here are some interesting statistics: Americans consume for air conditioning the same amount of power that all 800 million Chinese need for everything. Energy used in this country is distributed for: Transportation 25%, Residential 11%, Industrial 42%, and Business 14%.

One-fourth of the energy is turned into electricity before it is used by consumers. Electrical energy is wasteful as compared with the use of the fuel itself. When fuel is utilized to generate electrical power, only one-third of the fuel energy becomes electricity. For example, the electrically heated home requires about twice as much fuel per unit of heat as the gas or oil heated home.

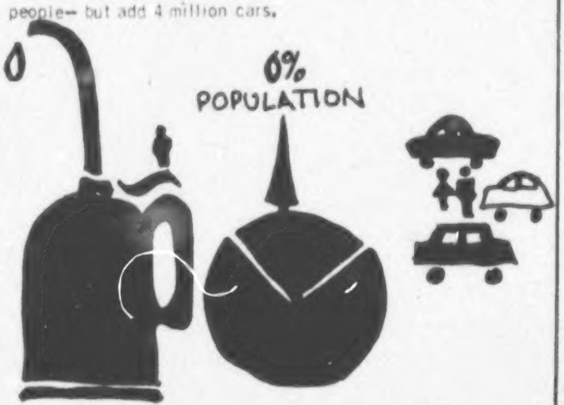
WHERE WE GET OUR ENERGY

Big switch from coal to petroleum products will probably have to swing back to coal. Nuclear energy expanding fast— but not fast enough.



AMERICANS ARE ENERGY GLUTTONS

We have 6% of earth's population but consume 30% of total energy. Each year we have a net gain of 2 million people— but add 4 million cars.



On the spaceship earth, non-renewable fuel resources are considered to be limited or finite. Supplies of coal in this country should last for several hundred years, but gas and oil supplies are not as abundant. Research indicates that we must carefully consider our use of gas and oil as known reserves in this country are in very short supply.

To protect ourselves from shortages we must not only instigate governmental regulations but we must push the nation into a new "energy conservation ethic." One of the first steps is efficiency requirements for the automobile which consumes a disproportionate amount of energy. In the long run, entire patterns of transportation will have to be changed. Per passenger mile, cars are less than one-half as efficient as buses and airplanes are only one-fifth as efficient as buses.

Much heat is lost because buildings are poorly insulated. Perhaps homeowners will have to backfit their homes with new insulation.

When we buy appliances, we must come to think of how much energy the appliance consumes. Surveys have shown that when two air conditioners which advertised the same cooling power were compared, one required twice as much energy as the other, apparently to do the same job.

Alternatives must be weighed by city, county and state governments, and by individuals. We cannot afford to wast energy.

II. ENVIRONMENTAL ENCOUNTER

A. Behabioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Explain the source of the various types of energy used in our daily lives, i.e. electricity, heating, and transportation.
2. Describe the difference between renewable and non-renewable resources.
3. Discuss the advantages and disadvantages of using electricity as opposed to using primary fuels.
4. Discuss wasteful uses of energy.
5. Suggest methods of conserving energy at school, at home and in the community.

B. Activities:

1. Survey the uses of electricity at home. What items use electricity? Could primary fuels be substituted? Each student can draw a home diagram and place all the items they can find. Have the class compile a list of these. Quiz the class and use a red dot to indicate whether most feel the item can be stopped, a yellow dot can show limited use, and green mark meaning it is considered necessary.
2. Visit a service station. Survey transportation on a busy street. Investigate the energy used by automobiles and other forms of transportation. How many people generally ride in one automobile? What is the average horsepower and rate of gasoline consumption of the automobiles surveyed? How could the energy consumed by automobiles be reduced? How is gas milage affected by the condition of the automobile's engine? How could the fuel used for transportation be reduced? What alternative methods of transportation could be used (bicycles, mass transit)? Is the mass transit system in Charlotte convenient? Why or why not? How will fuel shortages effect mass transit systems?
3. Contact local fuel companies. Gather information on sources of fuel. Are fuels considered to be renewable or non-renewable resources? Why? What are some of the problems associated with providing fuel in the United States? Is the rate of fuel consumption going up or down? Which fuels are in the shortest supply?
4. Study how electricity is produced, and visit a power plant if possible. What is the difference between a hydroelectric power plant, a fossil fuel plant, and a nuclear plant? Discuss each as to advantages and disadvantages to living things? How does the electricity come to your home?
5. Plan a campaign to cut down on daily fuel use at school and at home. Encourage the conservation of energy. The class can make a large newspaper for hall display. It may be labeled, N-ER-Gee. Write articles, editorials, cartoons, etc. on conservation. The class can also make posters with "catchy" slogans or cartoons. Try making display cards such as light switch slogans "Cut Off - Save a Watt of Energy!"
6. Investigate alternative methods of producing electricity. Children can collect articles in newspapers and magazines on geothermal energy, solar power, wind power, and using wastes for burning. Each can share these with the class. Discuss each if it is renewable or non-renewable. Advantages and disadvantages of each.

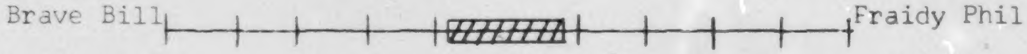
7. Children can study fossil fuels. They can draw the stories of formation and all the uses they can find for coal and petroleum. Are these renewable? What problems are involved in getting these fuels? Articles on strip-mining and oil shale can be discussed. How are we using these fuels? Are they in short supply? Cartoons on the energy crisis can be collected or drawn. Each can choose one to show on an opaque projector. Explain how it uses humor to make a point.
8. Survey the school. How is the school heated? Discuss insulation. What is the monthly electric bill? Heating bill? Is the school heated at night? On weekends? Are there wasteful uses of energy? The class can visit the heating system. Discuss and compare with other heating systems.
9. Have the class collect news headlines and articles on energy. How is transportation affected by the crisis? Business? What measures of conservation or regulations are suggested? Which ones do they use at home? At school?
10. Study how engines use energy to produce motion and power. Investigate the energy used by cars and other transportation. Make a survey of gasoline consumption in chart form as each student reports on the kind of car and the gas per mile consumption. How can this be reduced? What other methods of travel could be used?

## III. VALUES CLARIFICATION

Use techniques outlined in the Introduction for "Valuing the Environment."

A. Continuum"

1. If you were to build a home at the lake, and were told that the power plants used coal, where would you place yourself?
2. If you were to build a home at the lake and were told that the power plants used nuclear energy, where would you place yourself?



B. Values Voting:

1. Do you think we need an air conditioner?
2. Do you think we need a toaster?
3. Do you think we need an electric doorbell?
4. Do you think we need an electric stove?
5. Add those suggested in survey of home electrical items.

C. Values Grid:

1. Ask the students to suggest problems such as gas shortage, nuclear power, heating fuel, etc. List them on a chart similar to the one below, and mark them according to the following directions:

   Column 1. Check those that you are concerned about. Discuss the problems and how you feel or stand on each.

   Column 2. (After one or two days) Check those that you have talked about to others out of class.

   Column 3. Check those that you have thought about carefully. Discuss if feelings or stands have changed.

   Column 4. Check those that you have acted on or done anything about your belief.

   Column 5. ( After several days) Check those that you have repeatedly acted upon.

| Problems | 1 | 2 | 3 | 4 | 5 | What is your feelings or stand? |
|---|---|---|---|---|---|---|
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| 5. | | | | | | |
| | | | | | | |

D. Alternative Search:

On a large school diagram ask the children to list ways that they think energy can be saved, such as partial lighting, less heating, etc.

E. Role Playing:

"News to Choose" -- Children can choose and act out six o'clock news interviews. Headlines can be cut and pasted on cardboard. On the back list the participants, such as the reporter, service station owner, etc. Invent your own headlines or use those from newspapers and other sources.

F. Rank Order:

Rank the following according to your values judgement:

1. If your family were to buy a new car, which would you consider?
   ____Size and optional features.
   ____Gas consumption per mile.
   ____Space and use for family.
2. If you were to pick up a few items at the shopping center, which method of travel would you use?
   ____Walking
   ____Riding a bike
   ____Riding a car
3. If you wanted to go to the skating rink on Saturday, which would you choose?
   ____Car pooling
   ____Mass transit ( bus)
   ____Family car
4. If Americans must save even more gas, which do you think you would choose?
   ____Buy an electric car
   ____Ride a bus
   ____Buy a motorcycle

## IV. RESOURCES

Books:

The Social Sciences Concepts and Values, Brandwein and others, Harcourt Brace, 1970.

Science 5, & Science 6, Mallison, Mallison, Smallwood; Silver Burdett, 1968.

Concepts in Science, Paul F. Brandwein; Harcourt, Brace & World, Inc. 1969.

Today's Basic Science, Navarra and Zafferoni; Harper Row, 1969.

People and Their Environment, Matthew J. Brenner; J.G. Ferguson Publishing Co., 1972

Clarifying Values Through Subject Matter, Harmin, Kirschenbaum, Simon; Winston Press, 1973.

Magazines:

"Ranger Rick's Nature Magazine", National Wildlife Federation Inc., 1412 16th St., N.W. Washington, D.C., 20036, January, 1973.

"Audubon", National Audubon Society, 950 Third Ave, New York, N.Y. 10022, January-December, 1973 & 1974.

Films:

The Energy Challenge-Screen News Digest, 16mm, color, 26 min.

Energy The Dilemma, Churchill, 16mm., color, 20 min.

Energy: New Sources, Churchill, 16 mm., color, 20 min.

Energy: Less is More, Churchill, 16 mm., color, 18 min.

Energy: Nuclear Alternatives, Churchill, 16mm., color, 20 min.

# HOME SWEET HOME

Grades K-2

## I. INTRODUCTION

As our land is being developed more and more, building homes, roads and shopping areas, we are clearing more and more fields and woodland areas. We are bulldozing trees and filling in ponds and streams with sedimentation. The animals and plants that have lived in these areas either must adapt to living with man's changes or become extinct.

As we plan for the building and clearing that will occur in the future, we need to cooperate with nature in our planning of land use.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

After a successful encounter students should be able to:

1. Be able to identify a number of animals in the woods.
2. Be able to identify the type of homes these animals have.
3. Know the materials used in some of these homes.
4. Have a collection of unused animal homes or be able to reproduce several of these.
5. Be aware of the importance of land use planning.

### B. Activities:

1. Talk about animals we see near our home and school.
2. Take a walk and look for animal homes.
3. Look at pictures of other animals and their homes.
4. Talk about animal homes.
   - a) Where did the animal make his home?
   - b) Why did the animal build in this area ( near pond, in a tree, under ground?)
   - c) What materials did the animal use?
   - d) Why did the animals use these materials?
   - e) Why did the animals build this home?
5. Invite the program from the Nature Museum, "Animal Homes" to be presented to the class.
6. Make a collection of unused animal homes ( bird's nests, hornet's nest.) Plant these nests in the fall and observe plant growth from the seeds in the nests.
7. Write a creative story about an animal and its home.
8. Make a mural of a woodland area including field and pond areas, and put animals near their homes.
9. Make a shelter for animals on the school grounds.

## III. VALUES CLARIFICATION

### A. Values Voting:

1. How many of you would like to live in an area where animals live?
2. How many of you would like to have more animals living on the school grounds?
3. Would you give up part of the playground to plant trees and make animal homes?

### B. Values Auction:

Using pieces of homemade money ( pieces of construction paper,) bid on the following animals that you would like to live near you.

1. a rat

2. A bird.
3. A rabbit.
4. A frog.

C. Rank Order:

1. If you were an animal, which would you rather be?
   a) a squirrel
   b) a fox
   c) a bird
2. What animal home do you think you would like best?
   a) bird nest
   b) frog pond
   c) bear cave
3. Which animal would like to live near you?
   a) rabbit
   b) squirrel
   c) raccoon

D. Autobiographical Questionnaire:

1. How many of you have ever seen a bird nest?
2. How many of you have ever knocked a nest out of a tree?
3. How many of you would like to be knocked out of a bird nest?
4. How many of you have poked a stick into an animal home?
5. How many of you think that, if you were being poked at, you would like it?

IV. RESOURCES

Books:

Animal Homes, Pendendorf, Illa, Children's Press.
Everyday Animals, Allen, Gertrude, Houghton Mifflin Company.
The Community of Living Things in Field and Meadow, Ress, Etta, Creative Educational Society.
How Animals Live, Martin, Richard A., and Martin, Alice Finch, Golden Press, New York, 1965.
Field Study Guide for Environmental Education, Charlotte-Mecklenburg Schools, 1972.

Films:

Common Animals of the Woods, b/w, 11 min, EBF.
Looking at Birds, b/w, 10 min., EBF.
Two Little Raccoons, b/w, 11 min., McGraw-Hill.
We Explore the Woodland, b/w, 11 min., Coronet Films.
Animals at Work in Nature, b/w, 10 min., McGraw-Hill.
Animal Homes, b/w, 11 min., EBF.
Animals in Autumn, b/w, 11 min., EBF.

Filmstrips:

Animals Have Homes, McGraw-Hill.
Common Animals of the Woods, McGraw-Hill.
Animal Homes: Hollow Trees, McGraw-Hill.
Animals and Plants of the Forest, McGraw-Hill.
The Forest, A Stable Community, EBF.

# DON'T GO NEAR THE WATER

Grades K-2

I. INTRODUCTION

People are the pollutors; there's no doubt about it. People pollute the water by dumping their sewage into rivers without proper treatment. People pollute the rivers and streams by dumping toxic chemicals and oil into the waters. Also, people pollute rivers and streams by dumping in heated water and a rise in temperature of only a few degrees can be lethal to many plant and animal forms. Of course, the death of some of these species removes the food supply of species which prey on them. People pollute the seas by dumping garbage into them. Do people dare drink the water?

II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

The student should be able to:

1. Define water pollution - -natural and man-made.
2. Identify examples of water pollution in the community.
3. Discuss the effects of water pollution on us, other animals and plants.
4. Know ways to eliminate water pollution.

B. Activities:

1. Visit Charlotte's sewage disposal and water treatment plants.
2. Make field trips to polluted stream areas.
3. Clean up a section of a creek.
4. Write anti-pollution skits or songs. Sell buttons and bumper stickers.
5. Make experience charts.
6. Draw pictures.
7. Write reports entitled, "What water pollution means to me."
8. Collect pictures from magazines showing various means of water pollution - - "Picture File."

III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you never pollute?
2. How many of you sometimes pollute?
3. Do you like to pollute?
4. How many of you feel that it isn't right to pollute?
5. How many of you feel that you should tell others not to pollute?

IV: RESOURCES

Pamphlets:

"Environmental Education," Concepts Activities, Bibliography, State Department of Public Instruction, Raleigh, North Carolina, March, 1971.
"Water Pollution: Where Does it All Come From?", a slide-script presentation, Alan Lenk, February, 1973.
"Recycling Resources," Continental Can Company, Inc., 1971.
"Pollution," Environmental Education, 1972-73.

BOOKS:

Kids for Ecology, February, 1973
People and Their Environment, Teacher's Curriculum Guide to Conservation Education.

# TOPSY—TURFY

Grades K-2

## I. INTRODUCTION

Soil is one of our most important natural resources and we must depend upon it for most of our food. When it becomes too poor to grow good crops, then not enough food can be grown to meet the needs of the people; and, alas, not only will we have hungry people but our nation will decline. In addition to food, the land affords us such things as shelter, protection, recreational pleasures, aesthetics, clothes and medicine.

Let us take a look what has happened to America's soil resources since the first settlers arrived. The colonists found the land covered with a nine-inch layer of rich topsoil and it was not long before they began to grow very productive crops. Soon these early settlers exhausted their farm soil due to (a) a lack of knowledge of good farm practices, (b) failure to take proper measures to prevent soil erosion and (c) the lack of a wise land ethic. Therefore, as their land would no longer bear the required food and with an abundance of new land westward, they moved onto new fertile land to meet their needs.

Continuous abuse of the original topsoil down through the years has lost America much of its topsoil. It is now known that it takes hundreds of years just to build an inch of topsoil and that it can be washed away in a very short time if measures are not taken to prevent erosion. Therefore, conservationists are training farmers in good farm practices and advising logging companies. Botanists are experimenting with the use of different species of plants for prevention of erosion. Environmentalists are dealing with clarifying values dealing with a new land ethic which would hopefully save one of our earth's treasures - OUR SOIL.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the completion of a successful encounter, the student should be able to:

1. Identify the difference between wise and poor use of the land.
2. Know that plants need food ( nutrients), soil, water, and light in order to grow, or even, to stay alive.
3. Make several suggestions for improving the topsoil.
4. Through a garden project learn more about the importance of good fertile soil and to learn the value of man taking care of this Natural Resource.

B. Activities:

1. Take a walk around the neighborhood to observe good and bad soil care. (A Language Arts and an Art lesson could be tied in after this trip.)
2. Prepare some good soil and plant a garden at school. ( Where possible, children could also plant a garden at home.) After planting seeds in the good garden soil, then plant some in another spot where erosion has taken away the topsoil. Compare the growth of the plants in the different soils.

   Keep a diary of the growth and changes in the garden. The teacher could do the writing as the children dictate.

   Some of the children could write ( or tell) factual or creative stories about the garden. All children could draw picture stories about the garden.
3. A class trip to a plant nursery would be a good way to help the

children learn to identify and to care for their plants. A guided tour of the nursery plus some free time to ask questions and to browse. (The children might need to ask questions or to seek information in regard to their school garden. ) The exact purpose and questions would depend upon the needs of the class.

4. In order to prove that plants need water, try this experiment: Take two plants, water one plant each day. Do not water the other. After some days, what happened?
5. To prove that plants need light: Again, take two plants. Keep one plant in the light and keep the other in the dark. After some days what has happened to the plant that was kept in the dark?
6. In the classroom, the students could place several lima beans between two pieces of glass or in a glass jar. A damp blotter or paper towel could be placed inside to give moisture. The glass would allow the children to observe the beginning stages of plant growth and development.
7. The filmstrip, "How Plants Grow and Reproduce" would be an excellent way to teach the reproduction of plants. ( Filmstrip is by Society for Visual Education.)
8. A trip to the farm in order to see examples of good and bad use of the land. Look for examples of erosion and what has caused it. Notice the way the farmer has plowed his land. Why? Does fertile soil affect his crops? What is the farmer doing to save his fertile soil? ( Latta property operated by the Charlotte Nature Museum would be an excellent learning environment for such a field trip.)

## III. VALUES CLARIFICATION

A. Values Voting:

1. Could you live in a land where there were no plants at all?
2. Could wild animals live in a land where there were no plants?
3. Would you like to be a seed that was planted in "eroded" soil?
4. Would you like to plant your very own vegetable garden?

B. Role Playing:

1. Pretend that you are a seed planted in poor soil. Show us how you would feel.
2. Now pretend that you are a seed that has been planted in fertile soil. Show us how you would feel. ( Hand puppets could also be used in the above role playing. Let the puppets do the talking and acting.)

C. Rank Order:

Number 1, 2, 3

1. Which is your favorite tree?
    - Oak
    - Pine
    - Apple
2. Which is your favorite flower?
    - Daisy
    - Violet
    - Rose
3. Which vegetable do you like best?
    - Lima beans
    - Corn
    - Squash
4. Which kind of soil would you prefer to be?
    - Black soil
    - Red soil
    - Rocky soil

IV. RESOURCES

Books:

World Book Encyclopedia

People and Their Environment, Teachers' Curriculum Guide to Conservation Education, ( Grades 1-2).

Clarifying Values Through Subject Matter, Merrill Harmin, H. Kirschenbaum, Sidney B. Simon, Winston Press, Inc., Minn.

Filmstrips:

"Your Friend the Soil: Keep it or Lose It", Encyclopedia Brittanica.
"The Muddy Raindrops", Society for Visual Education.
"The Wonderful World of Plants", Society for Visual Education.
"Plants and How They Grow", Society for Visual Education.
"Discovering Life Around Us", Society for Visual Education.
"How Plants Grow and Reproduce", Society for Visual Education.
"A Visit to a Garden", Encyclopedia Brittanica.
"Learning about Conservation", Coronet Films.
"Our Soil", Coronet Films
"Conservation for Today's America", Society for Visual Education.
"Soil Conservation Today", Society for Visual Education.

# TREES

### Grades 1-2

## I. INTRODUCTION

Trees are a living natural resource. From the earliest times trees furnished shelter, homes, furniture and countless articles and accessories for settlers.

In the city, trees interact with the living as well as with non-living elements of the environment. In the past, trees were recognized primarily for their shade and aesthetic value. Today, they are associated with many other ecological and human values.

Trees protect the soil and aid its water holding capacities.

Trees serve as windbreaks, reducing wind velocities and filtering out dust and other airborne particles.

Trees serve as air conditioners, moderating extremes in temperature. They absorb reflections from masonry, asphalt, and steel, reducing heat and glare.

Trees serve as fences to divide property. They act as buffers which absorb noise, especially between streets and homes.

Trees harbor wildlife.

And trees beautify the land, emit pleasant ordors, provide color, size, and pattern and provide a sense of privacy and security.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the completion of a successful encounter, the student will be able to:

1. List several reasons for having trees in the city.
2. Describe uses of trees in the area immediately surrounding the school.
3. Suggest where additional plantings might be beneficial.

### B. Activities:

1. Take a walk around the school ground and the immediate neighborhood. Does the temperature differ in tree-covered areas and in areas covered by pavement? Where are trees used as dividers? As noise buffers? Smell different kinds of trees. How does man injure trees? (Compacting the soil so roots can't get air and water, physically injuring them with machinery, subjecting them to automobile exhaust, etc.)
2. Take a tree inventory. Examine leaves closely. Why are some leaves "dirtier" than others? How do the trees improve the environment? What areas need more trees? Who takes care of the trees at the school? Observe leaves several hours after a rain. Are the leaves still wet? How does this help control water runoff and erosion? What do these trees contribute to the environment? Where would students like to have trees? What trees require a great deal of care? ( hedges, shaped trees, etc.) Does this increase their usefulness? Where are there very few trees? ( shopping centers, downtown) How does a lack of trees affect these areas?

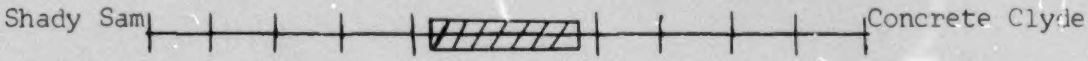
## III. VALUES CLARIFICATION

### A. Value Voting:

1. How many of you would plant a tree?
2. How many would like to see a city tree cut down?
3. How many enjoy sitting in the sun waiting for someone?
4. How many like parking lots?
5. How many of you would like to smell a tree?

B. Continuum:

When you play on a hot sunny day, would you choose to play with Shady Sam who plays on grass shaded by trees or Concrete Clyde who chooses to play on a treeless sidewalk?



C. Rank Order:

What do you think is the most important use of trees? Rank the choices 1 - 4.

a. Shade
b. Wood
c. Homes for wildlife
d. Beauty

IV. RESOURCES

Books:

The True Book of Trees, Illa Podendorf, Childrens Press, Chicago, 1954.
Junior Science Book of Trees, Robert S. Lemmon, The Garrard Press, Champaign, Illinois, 1960.
Thanks to Trees, Irma E. Webber, William R. Scott, Inc. New York, 1952.

Filmstrip:

"A Tree Is Nice", Weston Woods, color.

Films:

"Trees and Their Importance", color 12 minutes, 1966, Ency. Brit.
"A Tree Is a Living Thing", color, 11 minutes, 1964, Ency. Brit.

# POLLUTION IS WASTEFUL

Grades 1-2

NATURAL RESOURCES
TREASURES OF OUR EARTH

## I. INTRODUCTION

Pollution has been defined as "a resource out of place." The statement points out two interesting ideas; i.e., that pollution is wasteful and that humans are wasteful.

Even the earliest cavemen threw things away. They discarded tools, charred food, and broken pots. Well-preserved garbage dumps show us what our ancestor's lives were like. Most of what was thrown away was organic and was quickly recycled by the earth's own recycling process. Their lives were simple and their waste disposal problems were few.

A glance in any direction in any city reveals many signs of man's waste: air pollution, automobile exhaust, litter, water pollution. Man disposes of wastes in the air, in the water, and on the ground. The cost of clean-up is high. Many wastes cannot be easily reused. Technology is beginning to learn how to control polluting wastes. The next step will be to reuse the wastes.

Some steps have already been made. The black soot which once poured from the stacks of power generating plants can be trapped. The material is called fly ash. Fly ash is now being tested as a component of glassphalt, a substitute for asphalt, and contains some fly ash and glass cullet.

Present ways of disposing of trash are archaic and wasteful. They pollute the land with litter, the air by burning, and even the water. Landfills where the wastes are covered with soil daily and sometimes illegal dumps are the most common disposal sites. Dumping of trash can be expensive and wasteful. Several cities are experimenting with methods of using trash rather than throwing it out. Several cities plan to recycle metals,paper. A handful of cities are drying organic wastes, mixing them with coal, and using them as fuel.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Describe examples of wastes in the air, in the water, and on land.
2. Discuss how pollution is really a waste of our resources.
3. Discuss where trash comes from, such as: excessive packaging, throw-aways, wasteful habits etc.
4. Discuss several methods of disposing of trash such as burning, littering, illegal dumping, transporting to sanitary landfills, etc.
5. Discuss the problem of disposing of materials which are not broken down by nature such as glass and aluminum.
6. Suggest ways of cutting down on the amounts of trash which we must throw away.
7. Suggest ways of reusing trash such as recycling, using trash as fuel, etc.

B. Activities:

1. Take a walk around the school grounds. Note examples of waste, litter waste pollution ( even in puddles), air pollution ( exhaust from autos). List the examples of pollution when you return to the classroom. Ask students to guess where the wastes come from. What will happen to wastes on the ground, in the water, and in the air? Which wastes will nature dispose of naturally? Which will man dispose of? How are wastes and pollution related?

2. Note where classroom and cafeteria wastes go. Draw pictures of wastes on the ground, in the air, and in the water. Suggest how specific wastes can be reduced, controlled, or reused in the classroom or at home.
3. Write a letter to the sanitation department to find out how much money the community spend yearly on trash collection.
4. Initiate a clean-up campaign in the room -- make posters to encourage clean-up.
5. Examine the waste disposal system of the school. Make suggestions for cutting down on wastes in the classroom and/or at home.
6. Make and use a litterbag for use on the playground.

## III. VALUES CLARIFICATION

A. Values Voting:

1. Do you like to see empty cola bottles in a lake?
2. Do you like to see litter free yards?
3. How many of you feel you should teach others to pick up litter?
4. How many of you feel it is your duty to take out the trash at your house?
5. How many think littering is wasteful?
6. How many usually like electric toys better than toys which are not electric?
7. How many use paper towels at home rather than a reusable, washable towel?

B. Rank Order:

1. If you saw three candy wrappers on the way home from school, how would you rank these plans of action? Rank them 1-3.
   a. Leave them alone.
   b. Pick all three up, and put in first garbage can you see.
   c. Pick up only one wrapper, and roll it up and throw it to the child walking ahead of you.
2. If you were walking with some friends and one of them threw down a candy wrapper, how would you rank these plans of action? Rank them 1-3.
   a. Leave the paper alone.
   b. Pick up the paper.
   c. Explain to your friend why paper should not be thrown down.
3. If you have a broken toy, what would you do? Rank them 1-3.
   a. Have it repaired.
   b. Throw it away.
   c. Just leave it in your room.
4. If you had a pile of old newspapers, what would you do?
   a. Draw and paint on them.
   b. Save them for the paper drive.
   c. Throw them away.
5. If you could choose what to do with your cafeteria milk cartons, what would you do? Rank them 1- 3.
   a. Throw them away.
   b. Plant something in them.
   c. Save them for the paper drive.

C. Continuum:

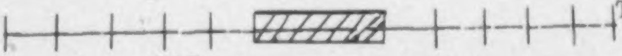
1. How many:

Always buy returnable soft drink bottles

Always buy throwaway soft drink cans and bottles

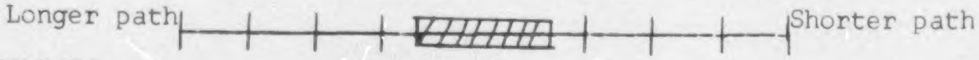
2. At parties in your home, does your family usually use paper plates and utensils or washable, reusable plates and utensils?

Reusable



Throwaways

3. You can walk to a park two ways. The longer path takes you by a pond with ducks swimming in it. The shorter path takes you through an ugly part of the city littered with trash. Which way would you go?



IV. RESOURCES:

Films:

"Environmental Action # 2 - Man Changes In the Earth", The Creative Teacher, 16 mm.

"The Litterbug", color, 8 minutes, primary-elementary, Disney, 1962.

Filmstrips:

"America's Urban Crisis", Society for Visual Education.

"Solid Waste: A New Pollutant", Society for Visual Education.

"Water Pollution: A Complex Problem", Society for Visual Education.

"The Air Pollution Menace," Society for Visual Education.

Transparency:

Pollution, Conservation Science Series, Hubbard Scientific Company, Northbrook, Illinois ( student level).

Books:

Environment and Man, Richard H. Wagner, W.W.Norton & Co.,1971.

Teacher's Curriculum Guide to Conservation Education, People and Their Environment: Grades 1-2-3-, Matthew J. Brennan, J. G. Ferguson Publishing Co., Chicago, Illinois.

Pollution, D. F. Wentworth, J.K.Couchman, J. C.MacBean, A. Stecher, Mine Publications, Inc.1971.

The Air We Breathe, Enid Bloome, Doubleday and Company, Inc., Garden City, N.Y.,1971 ( student level).

Our Dirty Air, Sarah M. Elliott, Julian Messner, A Division of Simon and Schuster, Inc.,1 West 39 Street, New York, N.Y. 1972 ( student level)

Clean Streets, Clean Water, Clean Air, Cynthia Chapin, Albert Whitman and Company, Chicago, 1970 ( student level).

An Introduction to Pollution, Harold E.Schlichting, Jr., and Mary Southworth Schlichting, Steck-Vaughn Company, Austin, Texas, 1972. ( Teacher level).

# RUN AWAY SOIL

Grades 3–4

## I. INTRODUCTION

Soil is one of our most basic and vital natural resources. However, a great deal of the fertile topsoil has been transported due to erosion, leaving behind a cementlike surface of packed soil and pebbles. The forces most responsible for this erosion are water, wind and ice.

Wherever rain falls on bare earth caused by poor agricultural practices, such as overgrazing, or fire, it cannot soak in, but runs off carrying a large amount of soil with it. As more soil is washed from a region, the remaining soil becomes less absorbant to the point that even light rains cause rushing gullies of silt-filled water. Thus, erosion becomes increasingly more serious with each succeeding rainfall. Exposed hills or steep slopes are extremely susceptible to erosion. The fact that water easily runs off eroded soil causes a multitude of further problems. During periods of heavy rainfall, the rivers become flooded with water that is flowing over the soil rather than being slowly absorbed by it. Dangerous flash floods often occur. When little or no rain falls, draughts occur since the soil retains little moisture. Streams and rivers which experience alternate periods of high and low water become virtually useless for navigation, town water supplies, hydroelectric power, and irrigation.

The costly measures that must be taken by governments to counteract the effects of erosion can be avoided only if the earth's surface can absorb and hold most of the rainfall in reserve beneath the surface.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the end of this encounter, the student should be able to

1. Understand and discuss that the earth's surface is being changed as erosion takes place.
2. Discuss how to prevent erosion of soil caused by water.
3. Recognize other kinds of erosion, such as erosion caused by wind and ice.
4. Discuss why topsoil is extremely valuable and should be preserved.

### B. Activities:

1. Take a class outside after a rainy day. Look for soil that has been removed.
2. Observe a hill where grass is growing, a hill where grass is not growing; note difference and discuss.
3. Plant flowers or grass in a clear area, leave one spot clear - - observe what happens after several rains.
4. Have pupils bring in cubes of soil from a clear area and cubes of soil from a grassy area. Make observations of the layers of soil. What changes take place when water is applied?
5. Observe sedimentation of water from muddy stream or lake after rain; observe from undisturbed lake or stream.
6. Observe how parking lots and paved areas have caused erosion of the soil unless drains have been provided for this purpose.
7. Give individual or group research assignments on the following topics for class discussion:
    - "Contour Plowing"
    - "Strip Farming"
    - "Grass Waterways"
    - "Terracing"
    - "Grazing"

"Cover [illegible]ps"
"Crop [illegible]ion"
"Irrigation and Drainage"

8. Invite a resource person from the community to speak to class on soil and mineral conservation.

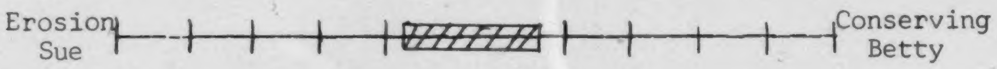
## III. VALUES CLARIFICATION

A. Values Voting:

1. How many of you would like to preserve our topsoil?
2. How would you like to live in an all-paved world?
3. How would you like to live in an all-grassy world?

B. Continuum:

Where would you place yourself on the line?



Betty plants grass and flowers in her yard to conserve topsoil and beautify her home. Sue lives on a hill with little grass and not any trees. Sue doesn't do anything to her grass or yard to beautify.

C. Composition:

Pretend you are topsoil. Tell how you would feel if you were being eroded.

D. Baker's Dozen:

1. shopping centers
2. paved play area
3. mountains
4. front lawn
5. plains
6. beaches
7. valleys
8. swamps
9. parking lots
10. bogs
11. parks
12. creeks
13. hills

## IV. RESOURCES

Books:

Soil Ecology, David, Nancy D.
Our Land and Its Care, Tenny, A.W.
The Grasslands and Man, McCue, George.
Profitable Soil Management, L. L. Knuti, M. Kaysi.
Conserving Soil, Butler, M.D.

Films:

"The Soil and Life," color, 14 min., UWF.
"The Golden Secret," 16 mm., 5 min. SCS.

Filmstrips:

"The Meaning of Conservation," MGHT.

# AWARENESS OF NATURAL VERSUS MAN MADE ENVIRONMENT Grades 3–4

## I. INTRODUCTION

Your environment is made up of many places -- your home, your school, your playground, city hall, parks, streets. Your neighborhood and your city are part of your environment. All of these places have been built by man. Some were created using materials provided by nature: trees and plants, rocks and minerals. Some were created by using man-made materials: plastics, aluminum, asphalt.

The city is a complex environment -- buildings, streets, parks, pipes, wires, and systems -- built to provide human life with considerable comfort. Man builds to satisfy his needs for survival, convenience, and comfort. Consider all the things we put into the city to support human life. What parts are added primarily for comfort?

There is a difference between the experience of walking slowly through a town, having time to notice things in detail, and driving through at 40 m.p.h. At higher speeds only the most obvious things are likely to catch your eye.

Two hundred years ago there were no highways, movie theatres or baseball parks. Today there are no forts, no blacksmiths and very few stables. The buildings and cities we live in are different from buildings and cities of the past. Man is continually changing the environment. The environment we build depends on our way of life. Change is natural. Even though man's biological needs stay the same, the way we meet these needs changes. For instance, there has always been a need to get from one place to another, but since the invention of the automobile, the environment has changed completely.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

The student should be able to:

1. Define environment -- natural and man-made.
2. Identify areas of natural and man-made environment in the community.
3. In the natural and man-made environment, identify areas of plant and animal life, temperature changes, noise changes, aesthetic differences, visual pollution.
4. Plan a course of action to help create a more natural environment in man-made areas.

B. Activities:

1. Take a 20 minute walk in your neighborhood -- walk slowly -- keep your eyes open.
   Make a diary of your walk.
   Where I walked ______________________________ Date __________.
   Man-made things I observed ______________________________
   ______________________________________________________
   ______________________________________________________.
   Natural things I observed ______________________________
   ______________________________________________________
   ______________________________________________________.
   I think my neighborhood has (check one) very few people ______
   too many people __________ a medium number of people _________.
   My neighborhood is (check one) open and full of light _________
   is shady with trees __________ is crowded with buildings but also
   has open space, light and trees ______________.

The area I live in is ( check one) urban ( city) ______________
suburban ( city outskirts) ______________ small town ____________
rural ( country) ____________________.
What I like about my neighborhood ______________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
What I would like to change or improve about my neighborhood
________________________________________________________________
________________________________________________________________

2. Investigate the school site and surrounding areas.
3. Tie the ends of a 3-foot rope together. Spread the rope in a circle on a grassy area. Count the life in this area. Fill in lists.

| Plants | No. | Animals | No. |
|---|---|---|---|
| Clover | | Beetles | |
| | | | |
| | | | |

What would the results be if you did it in an area paved or disturbed by man?

4. Record temperatures in many different kinds of places. Add to the list provided.
Enclose thermometer in an aluminum lined paper - radiation shield.

| Temperature Record | Date |
|---|---|
| Official weather bureau temp. | |
| 3 cm above sunny sidewalk | |
| 3 cm above grass in sun | |
| 1 m above grass in sun | |
| Under thick-leaved tree | |
| In 10 cm deep hole in the ground | |

5. List noises heard in natural and man-made environments. Compare and discuss.
6. Collect pictures of visual pollution at the shopping center and compare to other parts of the city, state and country.
7. Walk around the school and record feelings in a diary.

Walk Diary
Where ________________________________ Date __________
Small sounds I heard ______________________________
Small things I found ______________________________
Things I liked the best ____________________________

Observations

| Changes Caused by Nature | Changes Caused by Man |
|---|---|
| | |
| | |
| | |

8. Draw a picture of what you think your neighborhood will look like in the future.
9. Use kit "The City" offered through the Charlotte Nature Museum.

III. VALUES CLARIFICATION

A. Role Playing:

1. Pretend you are a city planner with all money available and plan your city to help the townspeople to live happily.

2. Pretend you are a housing expert. Your town has asked you to redesign your neighborhood. Write and draw changes you would make.
3. Two designs -- which do you like best? Why? Expand other designs.
1. 2.

B. Values Voting:
I believe:
1. That if I cut down a tree it will do no harm.
2. The smog in Charlotte is not dangerous because nobody has died from it yet.
3. Putting candy and gum wrappers into trash containers is one way to help prevent pollution.
4. Traffic causes too much noise.
5. People create many environmental problems for themselves.
6. It is cooler under the umbrella at Hardee's
7. My neighborhood is attractive.
8. Man-made beauty is better than natural beauty.

C. Rank Order:
1. Rank the following, listing the most beautiful first.
    a. Open meadow
    b. Vacant lot
    c. Landscaped building

    a. Tall building
    b. Shopping center
    c. House
2. What makes you feel the best?
    a. Fresh air
    b. A chance to play in pleasant natural surroundings
    c. Clean home and neighborhood
    d. Nice view from your window
3. Which do you prefer?
    a. Place to be alone
    b. Place to go to movie
    c. Clean pretty school with interesting equipment
    d. Nice view from your window
4. Which would you rather have in your neighborhood?
    a. Offices
    b. Factories
    c. Stores

    a. Office
    b. Shops
    c. Outdoors

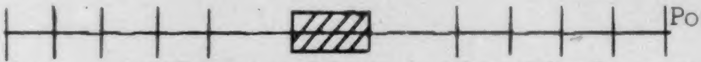
    a. Shops
    b. Parks
    c. Houses
5. Which would you rather have next door to you?
    a. Park
    b. Drive-in movie
    c. Vacant lot
    d. Business

D. Discuss or debate:
Give reasons and examples as to why you feel this way.
1. Does the environment make people the way they are?
or
2. Do people make the environment the way it is?

Composition:
Pretend you are an author and write a story about your neighborhood in the year 2020.

Continuum:
Mark your position.

Cabin Robin



Porky Yorky

Where would you rather live?

Robin wants to live alone in a cabin at the top of a mountain with no road leading to it.

Porky wants to live on the top floor of a 50 story high rise apartment in the middle of New York City.

## IV. RESOURCES

Pamphlets:

"First Follow Nature", Scholastic's Earth Corps Environmental Awareness Book 2, Maureen Hunter, Scholastic Book, New York, 1971.

"You and Your Environment", An Ecology Program, W.S.Houston, Part 2 American Education Publication, Columbus, Ohio, 1971.

Books:

Concepts in Science: Grades 2 - 3, Harcourt-Brace-World.

Today's Basic Science: Grades 2 - 3 , Harper Row.

Science: Grades 2 - 3, Silver Burdett.

Science Workbook: Grades 2 - 3, Golden Book.

Teacher's Curriculum Guide to Conservation Education, M.J.Brennan, J. G. Ferguson Publishing Company, Chicago, Illinois, 1968.

Kit:

"The City", Match Program, Children's Museum, Boston, American Science & Engineering, Inc. (available from the Charlotte Nature Museum.)

Films

"Nature's Half Acre", Color, Walt Disney, C, 33 minutes.

"Beaver Valley", Color, Walt Disney, 32 minutes.

"Living and Non-living Things", CORF.

# URBAN SOIL: USE OR MISUSE

Grades 3-4

## I. INTRODUCTION

Man is linked closely with the land. His very sustenance depends on the fruits of the land. But man's use of the land often becomes uncontrolled abuse of the land. Since his intervention, soil erosion has increased two and one-half times what it was before. It is estimated that 24 billion tons of material are moved annually by rivers to the earth's oceans. It takes only a few years for it to be washed uselessly downstream or to the oceans.

For many years after the disastrous soil losses during the 1930's the U.S.Soil Conservation Service's mandate was to deal with losses of agricultural top soil. Increasingly they are turning their efforts to urban soil problems as well. Research indicates that sediment eroded from areas undergoing suburban development can be as much as 50 to 500 times greater than in rural areas. For the Baltimore and Washington metropolitan areas, the annual sediment production is estimated to be one to two tons per person increase in population.

Erosion involves both the removal or detachment of soil particles and the transportation of soil particles by water and wind. Removing surface vegetation decreases cohesive forces between soil particles and exposes the soil directly to the erosive force of moving water and wind.

Land erosion is also increased by the amount of the speed of runoff water and wind. The amount and speed of urban runoff is increased by waterproofing surfaces and removing vegetation.

The consequences of soil erosion are many -- loss of productive agricultural land in rural areas and silt clogged streams and lakes. Of the four billion tons of sediment eroded in the United States each year, an estimated one and a half billion tons ends up in the nation's reservoirs. Reservoir storage capacity is decreased and the Government must spend millions annually to dredge harbors and waterways to keep them navigable.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Identify examples of erosion on the school grounds, in the neighborhood and in the community.
2. Explain the causes of soil erosion in urban as well as rural areas.
3. Discuss the impact of soil erosion on streams, lakes and reservoirs.
4. Plan and carry out simple erosion control techniques.

### B. Activities:

1. Walk around the school and into neighboring areas. Draw a map of the area covered and record results of the investigation on the map. Record areas where erosion is a problem. At each stop suggest why erosion is occuring ( construction, vegetation worn thin by traffic, neglect, etc.). Record areas which are waterproofed ( cement, asphalt, buildings, etc.). How does rain water run off the waterproofed area? Where does it go? What does it carry with it ( oil, gasoline, rubber pieces, etc.)? Record areas covered by natural vegetation. Does erosion occur in these areas? Why? Where does rain water go? Walk the area again after a heavy rain storm. Look for evidences of erosion and other results of moving water. Are there drainage ditches in the area which are only full after a heavy rain? Where does this water go? Collect samples of different types of soil and other ground cover. Collect in a large clear glass jar water running off an exposed bank and off a grassy area.

Compare the two. Does more water run off faster on the paved area, the area covered with vegetation or the exposed area? How could erosion be controlled?

2. Contact the Soil Conservation Service. Ask a representative to visit the school and walk the grounds and the neighborhood with the students. Discuss soil problems with the representative. Where is soil erosion a problem in Mecklenburg County? On a map of the County record county creeks. Indicate problem areas. Request information on the new sedimentation law. Developers must make provisions to prevent soil from washing from the construction site. How will developers prevent soil erosion?
3. As you cover the school area, see where erosion has been checked. See how we cause bare spots on our grounds. As you drive around Charlotte with your parents, note problems associated with soil erosion. What color are rivers and creeks after a heavy rainstorm? Why? Record areas of exposed soil on a map. Why are these areas exposed?
4. Choose one area where soil erosion is a problem. Propose several solutions for solving the problem. Carry out the plan. For example, cover a small area with grass seeds to show how this helps.

## III. VALUES CLARIFICATION

A. Values Voting:

1. Do you like to take walks?
2. Would you like to have a stream or lake in your backyard?
3. Would you visit a lake if it were close to you?
4. Do you enjoy walking in the rain?
5. Would you like a sandbox in your yard?
6. Would you like to plant something of your own? ( garden, flowers, grass, shrub, tree, vegetables).
7. Would you throw mud into a creek?
8. Which do you prefer a clear stream or a muddy one?

B. Rank Order:

1. If you could pitch a tent anywhere you wanted for the week-end, how would you rank the following places?
    a. Parking lot
    b. Beach
    c. Backyard
    d. Park
2. You are a weatherman and can control any of the following patterns for a complete day. How would you rank them?

| | | |
|---|---|---|
| a. Snow storm | Rain | Snow |
| b. Rain storm | Snow | Rain |
| c. Hail | Sleet | Cloudy |
| d. Tornado | Hail | Clear |

3. You have been given some land to use in any way you want. How will you rank them?
    a. Grazing land
    b. Department store
    c. Mining
    d. Natural

C. Composition:

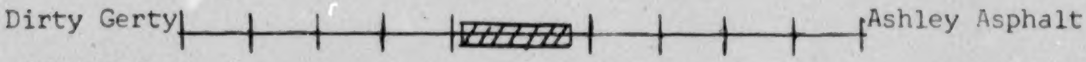
On the wheel write how you feel when you see signs of erosion.
Examples
a. On the school grounds
b. In your own yard
c. Grand canyon
d. Along road sides

D. Discuss or Debate:

Pretend you have a vacant lot next door to you and you can do anything you want to with it. What would you plan?

E. Continuum:

Mark your position. Dirty Gerty thinks everything should be dirt covered -- including roads -- not even any grass. Ashley Asphalt thinks everything should be covered with asphalt.



## IV. RESOURCES

Books:

Concepts in Science, Book 3, Harcourt Brace & World, 1966.

Clarifying Values Through Subject Matter. M. Harmin, H. Kirschenbaum, S. Simon, Winston Press, 1973.

People and Their Environment, (Teacher's Curriculum Guide to Conservation), Matthew J. Brennan, Ferguson Publishing Company, 1968.

Science 3, Silver Burdett, 1968.

Science Far and Near, Herman and Nina Schneider, D.C. Health, 1964.

Soil Conservation, Terry Shannon, Melmot, 1963.

Urbanization and Environment: Physical Geography of the City, T. R. Detwyler, M.S. Marcus, Duxbury Press, 1972.

Films:

"Adventures of Junior Raindrop", SCS, USDA.

"The Lamb and Bluebells", CORF.

"Soil Conservation Today", Society for Visual Education.

"Our Soil", Coronet.

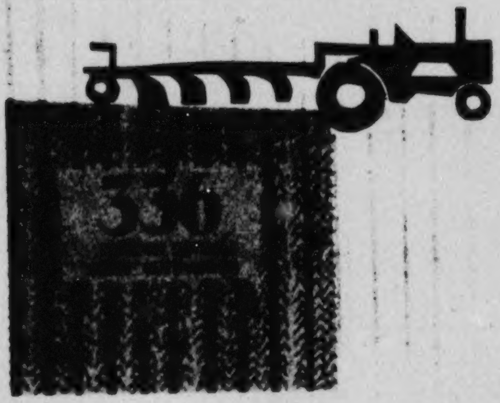
"Soil and Water Conservation", Health, black and white, 10 minutes.

"Water", CMC, color, 14 minutes.

### U.S. blessed with surplus cropland

Only 60% now being cropped. Additional land can be used when needed to feed growing U.S. population, plus demands of overseas hungry. But need broad land use plan for future.

**634** million acres suitable for cropland



### Two million acres lost

Each year we lose 2 million acres, but half goes for recreational uses where it can be enjoyed by generations to come.

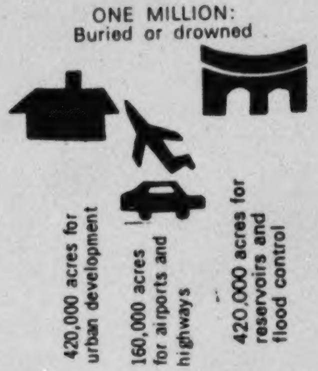
ONE MILLION:
Better outdoor living

More parks

Recreational areas

Wildlife refuges

ONE MILLION:
Buried or drowned



420,000 acres for urban development

160,000 acres for airports and highways

420,000 acres for reservoirs and flood control

### Better care needed

Experts say:

**64%**

of cropland needs better care to prevent erosion

of pasture land should have additional conservation

of private forest is poorly managed

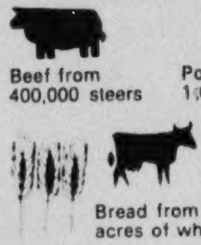
**16**

million acres now in crops should be in grass

### More mouths to feed

Grain and forage from 1 million additional acres is required to feed annual population increase in U.S.

Two million people use:



Beef from 400,000 steers

Pork from 1,000,000 hogs

Milk from 500,000 cow

Bread from 133,000 acres of wheat

# PERILS OF THE DEEP

Grades 5–6

## I. INTRODUCTION

Probably one of the first acts of man upon walking down to the beach was to touch the water. We have progressed immeasurably in using the "treasures" of the ocean. Oceans are waterways enabling ships to travel around the world carrying foods, supplies and people. Well-established fishing areas have supplied food to millions of people for long periods of time. Over-fishing is fast becoming a point of concern. Increases in the industrial and commercial uses of pearls and sponges have advanced fishing for marine products. Whaling for the purposes of obtaining oil, ambergris, bone flour or baleen, is still happening today. The hides of seals, sea otters, and polar bears are still held in high esteem by man - - various commodities, salt, magnesium, gypsum, borax and potassium - - are being extracted from the ocean "treasury" -- underwater petroleum deposits are rapidly being located and tapped.

## II. ENVIRONMENTAL ENCOUNTER

A. Behavioral Objectives:

At the completion of a successful encounter, the student should be able to:

1. Realize that from early times man has turned to the ocean for many of his needs.
2. Understand that we are steadily finding new uses and new products from the oceans of the world.
3. Recognize the fact that in our excitement over the wealth of the sea, we might upset the balance of nature in our ocean community and discuss ways we might preserve our ocean treasures.
4. To become aware of the minerals we obtain from the ocean and how they are used in daily life.
5. To understand that many new and helpful foods come from the oceans.

B. Activities:

1. Do research to find out about: (Social Studies and Language)
    - a. Ancient whaling practices )
    - b. Electric sea fishing )
    - c. Sea animals )
    - d. Minerals from the ocean )
    - e. Foods from the ocean )

    Choose one and report to class. Children may choose films or filmstrips as visual aids.
2. Present a project on how pearls are formed. ( Language)
3. Discuss how and where sponges are obtained off the coast of the United States and have students locate on map. ( Social Studies)
4. Have students consult references to determine patterns used in making sails for early sailing ships. ( Art)
5. Ask students to make a list of several minerals from the ocean and explain how they are used in daily life. ( Science)
6. Recommend that a small group construct a bulletin board, "Conserve our Ocean Treasures." ( Art Creativity)
7. Compare the speed and equipment of whaling ships of early days with modern-day fishing vessels. ( Math)
8. Discuss the rapid exhausting of our ocean resources and let students be reporters for a newspaper to inform the public that we need to preserve our ocean treasures. ( Science and Health)

9. Dramatize song, "Blow the Man Down;" let students write script and make costumes to demonstrate early travel and life on ships. (Language and Art Creativity)
10. Make a list of several products that come from the ocean. (Science)
    a. How do these organisms reproduce?
    b. How many are in danger of exhaustion?
11. Use reference books to locate maps showing mineral deposits in each country of the world. Divide class into committees. Are there countries where little or no manufacturing is possible? Make a list of countries that would profit by a successful underwater mining program. ( Social Science and Science)
12. Encourage students to express their ideas orally or written on this topic: "Is there a need for international cooperation among nations as expansion of undersea exploration goes forward? Why?

## III. VALUES CLARIFICATION

A. Values Decision:

1. If I had a choice, I would choose a coat made of
   a. wool  b. seal fur  c. cotton
2. If I had an opportunity to help someone conserve our ocean treasures, I would do this:
   a. with vigor  b. moderately  c. very little enthusiasm

B. Value Voting:

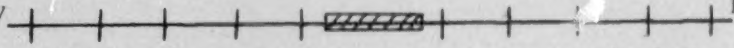
1. I have often thought of ways that we could preserve our animals of the sea.
2. Have you ever caught fish and thrown them away?
3. I would be willing to write to the proper people to encourage ocean treasure conservation.
4. How many would like to live in a world with no marine life?

C. Values Continuum:

Where would you place yourself on the following?

1. I am in a position to vote on more tapping for petroleum under the ocean.

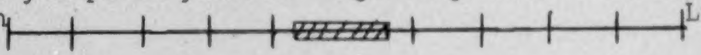
All the way Jill



Hold-Up Bill

2. Where would you place yourself regarding ocean animals?

Open Season Jack



Limited Hunting Mack

D. Unfinished Sentences:

1. If an oil slick occurred, I would ______________________________.
2. If foods, such as kelp and seaweed were available, I would encourage my family to ______________________________.

## IV. RESOURCES

Books

Oceanography, Ottleb and Cadice, Millikan Publishing Co., 1968.
World Book Encyclopedia, Vol. O,1974.
Music Is Fun, William R. Sur, Prentice Hall, Inc.,1965.
The Books of Popular Science, Grolier, Inc., Ocean Pollution, Vol. 9, pp. 339-40.

Pamphlets:

Environment Action Bulletin, Rodale, "Return of the Tall Ships," vol. 3, No. 30, Sept. 30, 1972.
Environment Action Bulletin, Rodale, Fishing -- Rich Harvest - But How Long?"

Films:

Plankton - Pastures of the Ocean, 16 mm, 10 minutes, PROD-MGHT.
Life in the Sea, 16 mm, (B & W), 11 min., PROD-EBF.
Beach and Sea Animals, 2nd ed., ( B & E) 11 min. PROD-EBF, 16 mm.
Sea Shell Animals, 2nd ed., (B & W), 10 min., PROD-FA, 16 mm.
Secrets of the Underwater World, color, 16 min., PROD-Disney, 16 mm.

Filmstrips:

Man and the Ocean, casettes for filmstrips, Nystrom, 1971.

# GARBAGE FOR ECOLOGY: COMPOSTING

Grades 5–6

## I. INTRODUCTION

The United States of America is the most wasteful nation the earth has ever seen. Each American throws out a ton of garbage and wastes each year. Recycling of wastes is essential. Bottles can be reused, cans can be recycled, junked autos already provide more than half of the steel for new cars. Recycled paper already saves 200 million trees a year. In the future, garbage may be processed into crude oil. Industry and research projects are proving that recycling can be economically sound.

Composting, properly practiced, can be a nuisance-free way to recycle organic solid wastes without significantly polluting water, air and land resources. Properly managed composting will produce a product safe for agriculture and gardening use. Compost cannot be considered a fertilizer. Its main value seems to be its high organic content as a soil conditioner, which will provide poor soils with better tilth, water-hold capacity and improved nutrient-holding capacity.

Compost is a mixture of soil and partly-decayed plants. Coffee grounds, egg shells, garden-plant clippings, grass clippings, leaves, including the outer leaves of vegetables, and manure are good materials for compost. These materials are spread in a layer about six inches deep and sprinkled with commercial fertilizer. This layer is covered with an inch of soil and a new layer of compost is started. The mixture should be watered frequently to speed decay. The compost is allowed to decay for about six months before using.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

At the conclusion of a successful encounter, the children should be able to

1. Name several ways composting is an effective process to recycle organic solid wastes:
    a. Many different kinds of wastes can be used to make a compost.
    b. Reuse wastes rather than throwing them away.
    c. Reduces the amount of garbage.
2. Recognize that soil will benefit from application of compost.
3. Recognize that composting will produce a product safe for plants, gardens, flowers, etc.
4. Make a compost and apply it to soil and plants.

### B. Activities:

1. View filmstrips, "Introduction to Ecology," and " Soil Conservation Today" with recording.
2. Research information on how to make a compost and diagram a usable method.
3. As a class activity, locate a suitable spot and make a compost on the school grounds.
4. Collect scraps such as egg shells, coffee grounds, leaves, outer leaves of vegetables and grass clippings.
5. Plant a small garden plot with vegetables and flowers such as squash, cucumber, beans, peas, onions, marigolds, daffodils and zinnias. Place compost on one half of the garden and leave the other half without.
6. Make small classroom gardens with vegetables and plants which may be set out later.

7. Mix compost mixture when it's ready; with the soil in the garden, and around plants, shrubbery and flowers.
8. Students can encourage parents to make composts at home and report on progress.

## III. VALUE STRATEGIES

A. Value Voting:

1. Do you think garbage can be of value?
2. Can saving egg shells, coffee grounds, leaves, and vegetable scraps help ecology?
3. Would you like to help plant a garden?
4. Would you want to toss a compost pile?
5. Would it bother you to eat vegetables grown in soil enriched by garbage?

B. Ten Things I Could Do To Make A Compost:

(List 1 - 10) Children may list things like this:

1. save garbage
2. put it in a pile
3. rake leaves
4. collect grass cuttings
5. find a good spot
6. bury the material
7. toss compost
8. dig a hole
9. build a fence
10. put compost on plants.

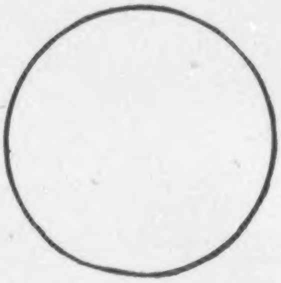
Questions:

1. Mark with a "X" the number of things that are available at your own home.
2. Mark with a "$" the things you must purchase.
3. Mark with a "S" the things you will do at school.
4. Mark with "P" those which require the most physical strength.

C. Alternative Search:

| Issue | I'll try it | I'll consider it | I Won't |
|---|---|---|---|
| 1. Collect garbage | | | |
| 2. Make a compost | | | |
| 3. Help plant a garden | | | |
| 4. Put compost on plants | | | |

D. Pie of Life:



Show on the circle what percentage of time each day you spend on these activities: studying; playing, ecology; and television.

## IV. RESOURCES

Books:

Young People's Science Encyclopedia, Vol. 5, Children's Press, Inc. 1962.
The World Book Encyclopedia, Vol. 4, Field Enterprises Educational Corporation, 1974.
Composting of Municipal Solid Wastes in the United States, U. S. Environmental Protection Agency, 1971.

Pamphlets:

"Every School Needs a Garden," Organic Gardening and Farming Magazine, Rodale Press, Inc., 1973.
"What is All That Sunshine for If Not a Little Gardening?" Organic Gardening and Farming Magazine, Rodale Press, Inc.
"Environment Action Bulletin," Rodale Press, Inc., Emmaus, Pa. 18049
Issues: February 12, 1972, 1 Vol. 3, No. 7.
April 1, 1972, Vol. 3, No. 14.
October 13, 1973, Vol. 4, No. 4.
March 23, 1974, Vol. 5, No. 12.
"1971 EQ Index, " National Wildlife Magazine; National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036.

Filmstrips:

"Soil: Earth's Greatest Treasure, " Health Science Filmstrip.
"Soil Conservation Today," ( with recording), SVE.
"Our Soil, " Coronet.
"Introduction to Ecology," McGraw-Hill.

Films:

"Soil and Water Conservation," Castle, 10 min.
"Plants Make Food, " Churchill, 11 min.
"Plant Growth," EBF, 10 min.

# RECYCLING-RUNNING IN CIRCLES

Grades 5–6

## I. INTRODUCTION

Nature creates no junkpiles, but the same cannot be said for man. Any neighborhood will tell the story -- buldging trash barrels beind each home, each store, each place of business. Americans throw away more than many nations manufacture. We live in a disposable society --throwaways, excessive packaging, paper, plastics, and cardboard. In 1920, the average household produced approximately two pounds of garbage each day. Today, on the average, each person produces more than five and one-half pounds per day. By 1980, it is estimated that the amount will be eight pounds per per person per day.

These wastes, solid wastes, trash and garbage, must be disposed of by the individual, by the home,by the school, and by the cities. On an average, disposal of solid waste is the third most expensive municipal service. Schools and roads are the number one and two expenses.

Present disposal methods are archaic and wasteful, polluting the land with litter, the air by burning, and the water by garbage disposals. Landfills where the wastes are covered with soil daily and dumps are the most common disposal sites. Dumping of solid wastes is expensive and wasteful. Several cities are experimenting with methods of using solid wastes rather than throwing them out. Several businesses are recycling metals and paper. A handful of cities are drying organic wastes, mixing them with coal,and using them as fuel.

A symptom of our disposable society is litter -- everywhere a problem which can be solved by working from two prospectives: (1) cutting down on throwaways at the source, and (2) instilling in the citizenry a reuse, remake, recycle ethic whereby individuals are conscious of wastes and make every effort to reuse and recycle them wherever possible.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behabioral Objectives:

At the conclusion of a successful encounter, the student should be able to:

1. Identify sources of solid wastes, i.e., excessive packaging, throwaways, wasteful habits, etc.
2. Discuss the environmental impact of several methods of disposing of solid wastes, i.e., burning, littering, dumping, transporting to sanitary landfills, etc.
3. Discuss the problems incurred by disposing of non-biodegradeable solid wastes.
4. Describe present methods of disposing of solid wastes at school, at home, and in public places.
5. Suggest alternative methods of cutting down on the amounts of solid waste which must be disposed of.
6. Suggest alternative methods of disposing of solid wastes, i.e., man-made recycling, using solid wastes as fuel, etc.

### B. Activities:

1. Survey the classroom. Where does trash go when it leaves the classroom? Who takes care of it? Weigh the amount of trash leaving the classroom. How could classroom wastes be reduced? What in the room could be recycled?

2. Survey the school. What kinds of trash, other than classroom trash are produced? By the office? By the cafeteria? Who takes care of these wastes? Where do the wastes go? How often are the dumpsters emptied? Weigh classroom trash. Keep a daily chart of the amounts. Could the paper wastes be recycled in Charlotte? Collected? Organize the school to save paper for a paper drive. Separate cans into: steel, aluminum, and bimetal.
3. Survey homes. How many garbage cans are filled each week? What makes up the biggest part of home wastes? Pay attention to the amount of packaging which must be thrown away. After shopping trips, examine the bags of groceries or other items. What must be thrown away? Is the packaging necessary? Write letters to several companies suggesting how they might cut down on excessive packaging.
4. Take a walk around the school community. Identify where solid wastes are disposed of -- in trash cans, dempsey dumpsters, or the ground ( litter), etc. Are there evidences of other waste problems--construction wastes, service station wastes ( oil from oil changes), disposable plates, cups, and utensils from quick service restaurants, etc. Where do community wastes go? Are any of them recycled? Can they be burned? Does the City of Charlotte have a law against open burning? Why? Are there air pollution problems associated with burning waste? Which of the wastes will decompose naturally in the landfill? What problems are presented by materials such as plastics, aluminum, and glass which don't decompose easily? What can be done with these types of materials ( reuse, recycle)? Chart types and amounts of litter observed. Where is litter the biggest problem? Why?
5. Study ways to:
   a. Reduce the amount of solid wastes
   b. Reuse materials and items rather than throwing them away
   c. Recycle materials

   Bring clothes from home which are not being worn for the clothing closet. Ask the bus driver to provide a place for litter. Wage a clean-up campaign. Present facts uncovered about excessive packaging and use of disposables to other classes and to parents. Sponsor a recycling drive.

III. VALUES CLARIFICATION

A. Values Voting:

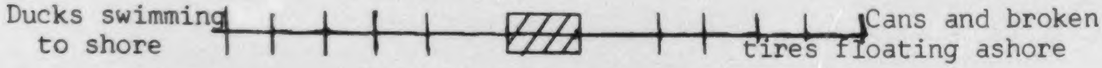
1. How many of you drop litter when walking?
2. How many of you are careful about keeping your yard picked up from unnecessary litter?
3. Have you ever thrown an empty cola bottle in a lake?
4. Have you ever left the peeling of a banana near the spot of your picnic?
5. Have you ever wrapped a gift two or three times to disguise its type?

B. Rank Order:

1. If you saw three candy wrappers on the way home from school, how would you rank these plans of action?
   a. Leave them alone
   b. Pick all three up and put in first garbage can you see
   c. Pick up only one wrapper and roll it up and throw it to the child walking ahead of you
2. If you were having a birthday party, how would you prefer the guests to bring the gifts to you?
   a. Wrapped colorfully
   b. Unwrapped in a brown bag
   c. Unwrapped and carried in one's hand

C. Continuum:

You can walk to a park two ways. One way takes you by a pond with ducks swimming in it. One way leads you by a pond with cans and pieces of tires around the edge. Which way would you go?



IV. RESOURCES

Filmstrips:

"Waste, A New Pollutant," Society for Visual Education, SF # 5, Color.

"Environmental Action# 2 - Man Changes In the Earth," The Creative Teacher, Color.

Films:

"The Litterbug," # 7900 ( Charlotte-Mecklenburg School System). Color, 8 minutes, Prod.-Disney, 1962.

Books:

Environment and Man, Richard H. Wagner, W.W.Norton & Company, 1971.

Teacher's Curriculum Guide to Conservation Education, People and Their Environment: Grades 1 - 2 - 3, Matthew J. Brennan, J. G. Ferguson Publishing Company.

Pollution, D. F. Wentworth, J. K. Couchman, J. C. MacBean, A. Stecher, Mine Publications, Inc., 1971.

# THE CLOUD BUSTERS

Grades 5-6

## I. INTRODUCTION

What part is man playing in controlling and altering the hydrological cycle? The hydrological cycle is a complex sequence of conditions through which water naturally passes from water vapor in the atmosphere through precipitation upon land and water and finally back into the atmosphere.

Knowledge of the way in which ice crystals form has led man in his first steps toward controlling precipitation. This is done by releasing silver iodide crystals into clouds by firing special rockets or dropping silver iodide flares from aircraft or using powdered dry ice. These techniques for causing clouds to form precipitation are usually called "seeding". However, generous amounts of rain may please farmers while causing problems for other people. Generally, scientists agree much research is needed in this area before knowing how environmentally sound these practices are.

The Coweeta Hydrologic Laboratory of the United States Forest Service is conducting extensive research to determine the effects of forest and land management practices on the water regime in the Mountain and Piedmont regions of North Carolina, South Carolina and Georgia. The effect on the watersheds of differing vegetation is being studied to determine the relative value of different plant covers in reducing runoff.

Reforestation can act as a cooling system and plays a vital role in the water cycle. Trees through transpiration offers an excellent means of lowering the temperature and returns clean water to the cycle.

Another way man is altering the water cycle is channelization. This involves changing the speed and direction of running water. With proper management and design, channelization can control part of the hydrology of an area and enhance the biotic aspects.

America's demands for usable water is increasing rapidly, therefore, man must look closely at all aspects of his environment and decide those management solutions especially those dealing with the hydrological cycle which will allow him to live optimally.

## II. ENVIRONMENTAL ENCOUNTER

### A. Behavioral Objectives:

After a successful encounter the student should be able to:

1. Identify three basic cloud formations
   - a) Stratus
   - b) Cirrus
   - c) Cumulus
2. Have a working knowledge of these and other words:
   - a) Evaporate
   - b) Condensation
   - c) Seeding
   - d) Hydrological
   - e) Energy
   - f) Gravity
   - g) Hurricane
   - h) Vapor
   - i) Channelization
   - j) Watershed
   - k) Nuclear
   - l) Transpiration

3. Understand the hydrological process
4. Identify and explain new/old experiments being tested to alter/control the hydrological process.

B. Activities:

1. Take a field trip around your school, over a several day period, to observe clouds.
    - a) While on the field trip, draw and/or write about cloud formations.
    - b) View films, filmstrips, pertaining to clouds, weather.
2. Discuss the three basic cloud formations: Cumulus, Stratus, Cirrus.
    - a) Discuss the levels of these clouds ( approximate) altitudes:
      Cumulus: between 6,500 - 20,000 feet;
      Cirrus: between 10,000 - 30,000 feet;
      Stratus: seldom higher than 3,000 feet.
    - b) Discuss and estimate the speed of travel of these clouds. Excellent place to make weather instruments to clock speed, or use material from Nature Museum. Then simply estimate on your own and verify with these instruments plus consulting with Weather Bureau.
    - c) Use drawings, writings ( poetry, music), to further enhance study. Tape recorder could be used to tape sounds during storm and other activity.
3. Allow time and material to be used for project-making.
    - a) Make clouds ( cotton is great for this), compare ideal situation with undesirable situation.
    - b) Make projects showing hydrological process -- ( use new ideas: seeding, water shed, channelization, etc.).
    - c) Great opportunity for students to create puzzle and make questions that are of interest to them.
4. Resource Persons:
    - a) Seeding: Weather Bureau
      Charles Vizzini
    - b) Cooling Tower: Duke Power Official
    - c) Water Shed: Ed Jones, North Carolina State Forestry Division.

## III. VALUES CLARIFICATION

A. Brain Storming:

1. Divide into small groups, discuss and list main cloud formations, levels and speed. Another group later could have the study of the hydrological process. Still later new experiments being used to alter/control this process. After discussion in small groups, bring back for total class discussion and finalizing. List at least three main ideas.
2. List conclusions in rank order. There must not be absolute evaluation, but an opportunity for students to express themselves without fear of grading.

B. I Learned That:

1. The three basic cloud formations are ________________________.
2. The following ways of altering/controlling the hydrological cycle are ____________________________________________.
3. Fog is a cloud.

## IV. RESOURCES

BOOKS:

Concepts in Science, 4 and 5, Brandwein, Paul F., Harcourt Brace, and World, Inc., New York, 1966.

*Values Clarification*, Simon, Sidney B.; Howe, Leland W., Kirschenbaum, Howard. A handbook of Practical Strategies for Teachers and Student, New York: Hart Publishing Co., 1972.

*World Book Encyclopedia*, Field Enterprises Education Corporation, Chicago, Illinois, 1974.

Pamphlets:

"The Hydrologic Data Network of the United States," Geological Survey, Government Printing Office, Washington, D.C. 20402, 1968, 15 pp.

"A Study of the Hydrology of Eastern North America Using Atmospheric Vapor Flux Data," Environmental Science Service Administration, Washington Science Center, Building 5, Rockville, Maryland,20852, Order No.Com.71C0383.

"Environmental Action Bulletin," Robert Rodale, Pub., Rodale Press, Inc., Emmaus, Pa. 19049.
Articles from August 5, 1972, Vol.3, No. 32.
February 12, 1972, Vol.3, No. 7.
December 23, 1972, Vol 3, No. 52.

Filmstrips:

"Introduction to Ecology," Ecology and Man Series, Set, McGraw-Hill Book Co., Testfilms, 1947.

"Finding Out About the Clouds," SVE, Basic Primary Science, Group II.

" Finding Out About the Sky," SVE, Basic Primary Science, Group I.